

JVC

SERVICE MANUAL

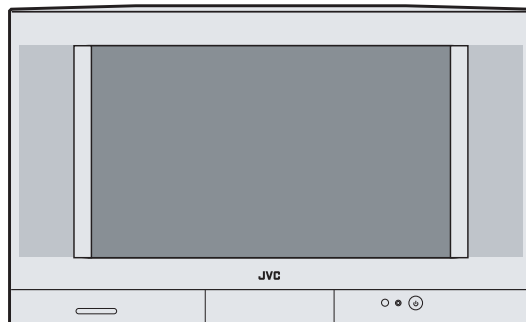
COLOUR TELEVISION

**AV-28R4SK, AV-28T4BK, AV-28T4SK,
AV-28T4SP, AV-28T4BR, AV-28T4SR,
AV-28T77SK, AV-32R4SK, AV-32T4SK,
AV-32T4SP, AV-32T4SR, AV-32T77SK**

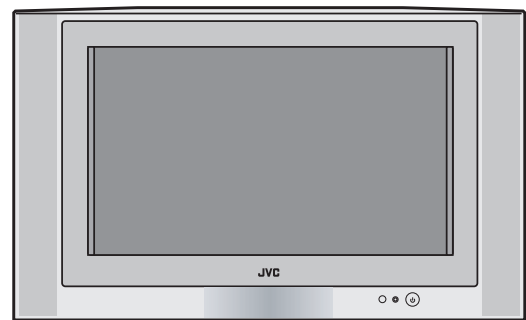
BASIC CHASSIS

JW

InterArt
Natural Vision
T-V LINK



AV-28R4SK, AV-28T4BK, AV-28T4SK,
AV-28T4SP, AV-28T4BR, AV-28T4SR,
AV-32R4SK, AV-32T4SK, AV-32T4SP,
AV-32T4SR



AV-28T77SK
AV-32T77SK

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SPECIFICATION

Items		Contents	
		AV-28R4SK	AV-28T4SK AV-28T4BK AV-28T4SR AV-28T4BR AV-28T77SK
Dimensions (W × H × D)		85.4cm × 50.8cm × 49.7cm	85.4cm × 50.7cm × 49.7cm 85.4cm × 50.7cm × 48.9cm [AV-28T77SK]
Mass		42.0kg	42.0kg 39.0kg [AV-28T77SK]
TV RF System		CCIR (I)	CCIR (B/G, I, L)
Colour System		PAL NTSC3.58 / NTSC4.43 (Only EXT mode)	PAL SECAM NTSC3.58 / NTSC4.43 (Only EXT mode)
Stereo System		NICAM (I)	A2 (B/G) NICAM (B/G, I, L)
Receiving Frequency	VHF	---	47MHz - 470MHz
	UHF	470MHz - 862MHz	
	French CATV	---	116MHz - 172MHz 220MHz - 469MHz
Intermediate Frequency	VIF	38.9MHz (I)	38.9MHz (B/G, I, L) 33.9MHz (L')
	SIF	32.9MHz (6.0MHz :I)	33.4MHz (5.5MHz :B/G) 32.9MHz (6.0MHz:I) 32.4MHz (6.5MHz :L)
Colour Sub Carrier Frequency	PAL	4.43MHz	
	SECAM	---	4.40625MHz / 4.25MHz
	NTSC	3.58MHz / 4.43MHz	
Teletext System		FLOF (Fastext level 2.5) WST(Standard system)	TOP (German system) FLOF (Fastext level 2.5 720P) WST (Standard system)
Power Input		AC 220V~AC240V, 50Hz	
Power Consumption		125W(Max) / 115W(Avg) Standby : 2.7W	120W(Max) / 110W(Avg) Standby : 2.7W
Picture Tube		Visible size : 66cm [measured diagonally] (H : 58.3cm × V : 33.0cm)	
High Voltage		31.0kV (+1kV / -1.5kV) (at zero beam current)	
Speaker		MAIN : 6.5cm × 13cm oval type × 2 CENTER : 4cm × 16cm oval type × 2 SUB WOOFER : 13cm round type × 1	6.5cm × 13cm oval type × 2
Audio Power Output		MAIN : 10W + 10W CENTER : 10W SUB WOOFER : 18W	10W + 10W
Aerial Input Terminal		75 Ω unbalanced, coaxial	
EXT-1 / EXT-2 / EXT-3 (Input / Output)		21-pin Euro connector (SCART socket × 3)	
EXT-4	S-Video	Mini-DIN 4-pin × 1 Y : 1V(p-p) positive, negative sync 75Ω C : 0.286V(p-p) (burst signal) 75Ω	---
	Video	1V(p-p) positive, negative sync provided, 75Ω, RCA pin jack × 1	
	Audio	500mV(rms) (-4dBs), high impedance, RCA pin jack × 2	
Audio Out (variable)		0 - 1000V(rms), low impedance, RCA pin jack × 2	
Surround Rear Terminal		7.5W + 7.5W, 8 Ω	---
Headphone Jack		Stereo mini jack, Ø3.5mm × 1	
Remote Control Unit		RM-C1502-1C (AA/R6 dry cell battery × 2)	RM-C1502-1C (AA/R6 dry cell battery × 2)

Design & specifications are subject to change without notice.

[AV-28R4SK]

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"Dolby" and the double-D symbol  are trademarks of Dolby Laboratories Licensing Corporation.

Items		Contents		
		AV-32R4SK	AV-32T4SK AV-32T4SR AV-32T77SK	AV-32T4SP
Dimensions (W × H × D)		94.8cm × 56.2cm × 55.4cm	94.8cm × 56.2cm × 55.4cm 94.6cm × 56.2cm × 54.7cm [AV-32T77SK]	94.8cm × 56.2cm × 55.0cm
Mass		56.0kg	56.0kg 53.0kg [AV-32T77SK]	53.0kg
TV RF System		CCIR (I)		CCIR (B/G, I, L)
Colour System		PAL NTSC3.58 / NTSC4.43 (Only EXT mode)		PAL SECAM NTSC3.58/NTSC4.43 (Only EXT mode)
Stereo System		NICAM (I)		A2 (B/G) NICAM (B/G, I, L)
Receiving Frequency	VHF	---		47MHz - 470MHz
	UHF	470MHz - 862MHz		
	French CATV	---		116MHz - 172MHz 220MHz - 469MHz
Intermediate Frequency	VIF	38.9MHz (I)		38.9MHz (B/G, I, L) 33.9MHz (L')
	SIF	32.9MHz (6.0MHz :I)		33.4MHz (5.5MHz :B/G) 32.9MHz (6.0MHz:I) 32.4MHz (6.5MHz :L)
Colour Sub Carrier Frequency	PAL	4.43MHz		4.40625MHz / 4.25MHz
	SECAM	---		
	NTSC	3.58MHz / 4.43MHz		
Teletext System		FLOF (Fastext level 2.5) WST(Standard system)		TOP (German system) FLOF (Fastext level 2.5 720P) WST (Standard system)
Power Input		AC 220V~AC240V, 50Hz		
Power Consumption		125W(Max) / 115W(Avg) Standby : 2.7W	120W(Max) / 110W(Avg) Standby : 2.7W	
Picture Tube		Visible size : 76cm [measured diagonally] (H : 67.4cm × V : 38.4cm)		
High Voltage		31.0kV (+1kV / -1.5kV) (at zero beam current)		
Speaker		MAIN : 6.5cm × 13cm oval type × 2 CENTER : 4cm × 16cm oval type × 2 SUB WOOFER : 13cm round type × 1	6.5cm × 13cm oval type × 2	
Audio Power Output		MAIN : 10W + 10W CENTER : 10W SUB WOOFER : 18W	10W + 10W	
Aerial Input Terminal		75 Ω unbalanced, coaxial		
EXT-1 / EXT-2 / EXT-3 (Input / Output)		21-pin Euro connector (SCART socket × 3)		
EXT-4	S-Video	Mini-DIN 4-pin × 1 Y : 1V(p-p) positive, negative sync 75Ω C : 0.286V(p-p) (burst signal) 75Ω	---	
	Video	1V(p-p) positive, negative sync provided, 75Ω, RCA pin jack × 1		
	Audio	500mV(rms) (-4dBs), high impedance, RCA pin jack × 2		
Audio Out (variable)		0 - 1000V(rms), low impedance, RCA pin jack × 2		
Surround Rear Terminal		7.5W + 7.5W, 8 Ω	---	
Headphone Jack		Stereo mini jack (Ø3.5mm × 1)		
Remote Control Unit		RM-C1502-1C (AA/R6 dry cell battery × 2)		

Design & specifications are subject to change without notice.

[AV-32R4SK]

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SECTION 1

PRECAUTION

1.1 SAFETY PRECAUTIONS [EXCEPT FOR UK]

- (1) The design of this product contains special hardware, many circuits and components specially for safety purposes. For continued protection, no changes should be made to the original design unless authorized in writing by the manufacturer. Replacement parts must be identical to those used in the original circuits. Service should be performed by qualified personnel only.
- (2) Alterations of the design or circuitry of the products should not be made. Any design alterations or additions will void the manufacturer's warranty and will further relieve the manufacturer of responsibility for personal injury or property damage resulting therefrom.
- (3) Many electrical and mechanical parts in the products have special safety-related characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in the parts list of Service manual. **Electrical components having such features are identified by shading on the schematics and by (Δ) on the parts list in Service manual.** The use of a substitute replacement which does not have the same safety characteristics as the recommended replacement part shown in the parts list of Service manual may cause shock, fire, or other hazards.
- (4) **Don't short between the LIVE side ground and ISOLATED (NEUTRAL) side ground or EARTH side ground when repairing.**
Some model's power circuit is partly different in the GND. The difference of the GND is shown by the LIVE : ($\perp$) side GND, the ISOLATED (NEUTRAL) : ($\equiv$) side GND and EARTH : ($\oplus$) side GND.
Don't short between the LIVE side GND and ISOLATED (NEUTRAL) side GND or EARTH side GND and never measure the LIVE side GND and ISOLATED (NEUTRAL) side GND or EARTH side GND at the same time with a measuring apparatus (oscilloscope etc.). If above note will not be kept, a fuse or any parts will be broken.
- (5) If any repair has been made to the chassis, it is recommended that the B1 setting should be checked or adjusted (See B1 POWER SUPPLY check).
- (6) The high voltage applied to the picture tube must conform with that specified in Service manual. Excessive high voltage can cause an increase in X-Ray emission, arcing and possible component damage, therefore operation under excessive high voltage conditions should be kept to a minimum, or should be prevented. If severe arcing occurs, remove the AC power immediately and determine the cause by visual inspection (incorrect installation, cracked or melted high voltage harness, poor soldering, etc.). To maintain the proper minimum level of soft X-Ray emission, components in the high voltage circuitry including the picture tube must be the exact replacements or alternatives approved by the manufacturer of the complete product.
- (7) Do not check high voltage by drawing an arc. Use a high voltage meter or a high voltage probe with a VTVM. Discharge the picture tube before attempting meter connection, by connecting a clip lead to the ground frame and connecting the other end of the lead through a 10k Ω 2W resistor to the anode button.

- (8) When service is required, observe the original lead dress. Extra precaution should be given to assure correct lead dress in the high voltage circuit area. Where a short circuit has occurred, those components that indicate evidence of overheating should be replaced. Always use the manufacturer's replacement components.

(9) Isolation Check (Safety for Electrical Shock Hazard)

After re-assembling the product, always perform an isolation check on the exposed metal parts of the cabinet (antenna terminals, video/audio input and output terminals, Control knobs, metal cabinet, screw heads, earphone jack, control shafts, etc.) to be sure the product is safe to operate without danger of electrical shock.

a) Dielectric Strength Test

The isolation between the AC primary circuit and all metal parts exposed to the user, particularly any exposed metal part having a return path to the chassis should withstand a voltage of 3000V AC (r.m.s.) for a period of one second. (. . . Withstand a voltage of 1100V AC (r.m.s.) to an appliance rated up to 120V, and 3000V AC (r.m.s.) to an appliance rated 200V or more, for a period of one second.) This method of test requires a test equipment not generally found in the service trade.

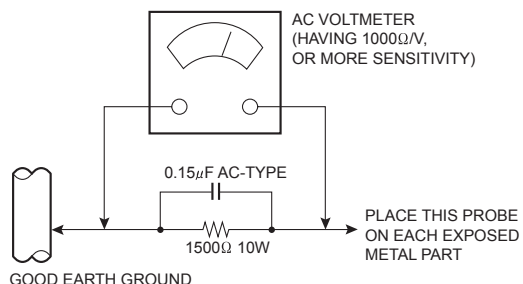
b) Leakage Current Check

Plug the AC line cord directly into the AC outlet (do not use a line isolation transformer during this check.). Using a "Leakage Current Tester", measure the leakage current from each exposed metal part of the cabinet, particularly any exposed metal part having a return path to the chassis, to a known good earth ground (water pipe, etc.). Any leakage current must not exceed 0.5mA AC (r.m.s.). However, in tropical area, this must not exceed 0.2mA AC (r.m.s.).

Alternate Check Method

Plug the AC line cord directly into the AC outlet (do not use a line isolation transformer during this check.). Use an AC voltmeter having 1000 Ω /V or more sensitivity in the following manner. Connect a 1500 Ω 10W resistor paralleled by a 0.15 μ F AC-type capacitor between an exposed metal part and a known good earth ground (water pipe, etc.). Measure the AC voltage across the resistor with the AC voltmeter. Move the resistor connection to each exposed metal part, particularly any exposed metal part having a return path to the chassis, and measure the AC voltage across the resistor. Now, reverse the plug in the AC outlet and repeat each measurement. Any voltage measured must not exceed 0.75V AC (r.m.s.). This corresponds to 0.5mA AC (r.m.s.).

However, in tropical area, this must not exceed 0.3V AC (r.m.s.). This corresponds to 0.2mA AC (r.m.s.).



1.2 SAFETY PRECAUTIONS [FOR UK]

- (1) The design of this product contains special hardware and many circuits and components specially for safety purposes. For continued protection, no changes should be made to the original design unless authorized in writing by the manufacturer. Replacement parts must be identical to those used in the original circuits. Service should be performed by qualified personnel only.
- (2) Alterations of the design or circuitry of the product should not be made. Any design alterations or additions will void the manufacturer's warranty and will further relieve the manufacturer of responsibility for personal injury or property damage resulting therefrom.
- (3) Many electrical and mechanical parts in the product have special safety-related characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by them necessary be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in the Parts List of Service Manual. Electrical components having such features are identified by shading on the schematics and by () on the Parts List in the Service Manual. The use of a substitute replacement which does not have the same safety characteristics as the recommended replacement part shown in the Parts List of Service Manual may cause shock, fire, or other hazards.
- (4) The leads in the products are routed and dressed with ties, clamps, tubing's, barriers and the like to be separated from live parts, high temperature parts, moving parts and / or sharp edges for the prevention of electric shock and fire hazard. When service is required, the original lead routing and dress should be observed, and it should be confirmed that they have been returned to normal, after re-assembling.

WARNING

- (1) The equipment has been designed and manufactured to meet international safety standards.
- (2) It is the legal responsibility of the repairer to ensure that these safety standards are maintained.
- (3) Repairs must be made in accordance with the relevant safety standards.
- (4) It is essential that safety critical components are replaced by approved parts.
- (5) If mains voltage selector is provided, check setting for local voltage.

SECTION 2

SPECIFIC SERVICE INSTRUCTIONS

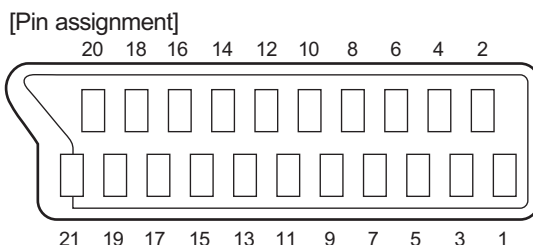
2.1 FEATURES

- New chassis design enable use of an interactive on screen control.
- The TELETEXT SYSTEM has a built-in FASTEXT (UK system), TOP (German system) and WST (world standard system) system.
- Because this TV unit corresponds to multiplex broadcast, users can enjoy music programs and sporting events with live realism. In addition, BILINGUAL programs can be heard in their original language.
- Users can make VCR dubbing of picture and sound by controlling the AV selector to select an optional source at the EXT-2 output.

2.2 21-pin Euro connector (SCART) : EXT-1/EXT-2/EXT-3

Pin No.	Signal designation	Matching value	EXT-1	EXT-2	EXT-3
1	AUDIO R output	500mV(rms) (Nominal), Low impedance	Used (TV OUT)	Used (LINE OUT)	Not used
2	AUDIO R input	500mV(rms) (Nominal), High impedance	Used (R1)	Used (R2)	Used (R3)
3	AUDIO L output	500mV(rms) (Nominal), Low impedance	Used (TV OUT)	Used (LINE OUT)	Not used
4	AUDIO GND		Used	Used	Used
5	GND (B)		Used	Used	Used
6	AUDIO L input	500mV(rms) (Nominal), High impedance	Used (L1)	Used (L2)	Used (L3)
7	B input	700mV _(B-W) , 75Ω	Used	Used	Not used
8	FUNCTION SW (SLOW SW)	Low : 0V-3V High : 8V-12V, High impedance	Used	Used	Used
9	GND (G)		Used	Used	Used
10	SCL / T-V LINK		Not used	Used (SCL2 / TV-LINK)	Not used
11	G input	700mV _(B-W) , 75Ω	Used	Used	Not used
12	SDA		Not used	Used (SDA2)	Not used
13	GND (R)		Used	Used	Used
14	GND (YS)		Used	Not used	Not used
15	R / C input	R : 700mV _(B-W) , 75Ω C : 300mV _(P-P) , 75Ω	Used (R)	Used (C2/R)	Used (C3)
16	Ys input (FAST SW)	Low : 0V-0.4V, High : 1V-3V, 75Ω	Used	Used	Not used
17	GND (VIDEO output)		Used	Used	Used
18	GND (VIDEO input)		Used	Used	Used
19	VIDEO output	1V _(P-P) (Negative sync), 75Ω	Used (TV OUT)	Used (LINE OUT)	Not used
20	VIDEO / Y input	1V _(P-P) (Negative sync), 75Ω	Used	Used	Used
21	COMMON GND		Used	Used	Used

(P-P= Peak to Peak, B-W= Blanking to white peak)

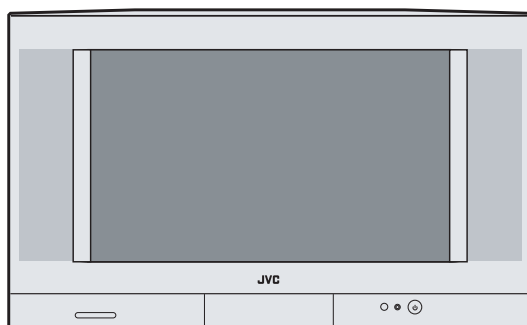


2.3 MAIN DIFFERENCE LIST

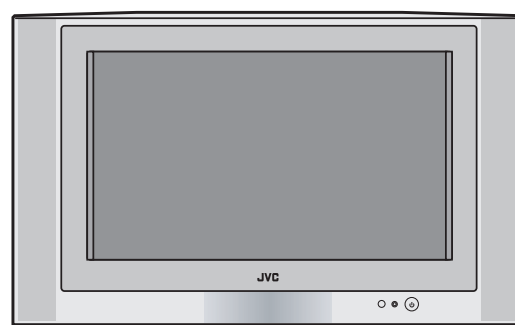
Item	AV-28R4SK	AV-28T4SK	AV-28T4BK	AV-28T4SR	AV-28T4BR	AV-28T77SK	AV-28T4SP
CABINET TYPE	A	←	←	←	←	B	A
CABINET COLOUR	Silver	←	Black	Silver	Black	Silver	Silver
DESTINATION	England	England	England	Ireland	Ireland	England	Germany Belgium France Switzerland Austria Italy Spain Portugal Sweden Denmark Finland Norway Greece
DOLBY SORROUND	YES	NO	←	←	←	←	←
SUB WOOFER	YES	NO	←	←	←	←	←
POWER PLUG	UK type(3pin)	←	←	←	←	←	EU type(2pin)
S VIDEO INPUT	YES	←	←	←	←	←	NO

Item	AV-32R4SK	AV-32T4SK	AV-32T4SR	AV-32T77SK	AV-32T4SP
CABINET TYPE	A	←	←	B	A
DESTINATION	England	England	Ireland	England	Germany Belgium France Switzerland Austria Italy Spain Portugal Sweden Denmark Finland Norway Greece
DOLBY SORROUND	YES	NO	←	←	←
SUB WOOFER	YES	NO	←	←	←
POWER PLUG	UK type(3pin)	←	←	←	EU type(2pin)
S VIDEO INPUT	YES	←	←	←	NO

CABINET TYPE



A type



B type

2.4 TECHNICAL INFORMATION

2.4.1 MAIN MI-COM (CPU) PIN FUNCTION

Pin No.	Pin name	I/O	Function	Pin No.	Pin name	I/O	Function
1	VssP2	--	GND	65	SVM	O	SVM output
2	VssC4	--	GND	66	FbiSo	I/O	Flyback input/SC output
3	V1.8C4	--	1.8V _D	67	Hout	O	H output
4	V3.3A3	--	3.3V	68	VssComb	--	GND for comb filter
5	VrefP_Sdac	--	3.3V	69	V5Comb	--	5V for comb filter
6	VrefN_Sdac	--	0V	70	Vin/R2/Pr	I	V-input for YUV
7	VrefP_Sdac	--	3.3V	71	Uin/B2/Pb	I	U-input for YUV
8	VrefN_Sdac	--	0V	72	Yin/G2/Y	I	Y-input for YUV
9	VrefP_Sdac	--	3.3V	73	Ysync	I	Y-input for SyncSep
10	Xtalin	I	XTALIN	74	Yout	O	Y-out
11	XtalOut	O	XTALOUT	75	Uout/INSSW2	I/O	U-out (2nd RGB/YPbPr insertion input)
12	VssA1	--	GND	76	Vout/Swo1	O	NC
13	Vguard/Swo	I/O	VGUARD or I/O switch	77	INSSW3	I	3rd RGB/YPbPr insertion
14	DecDig	--	Decoupling Digital Supply	78	R3/Pr	I	3rd R in/Pr in
15	V5P1	--	1st Supply 5V	79	G3/Y	I	3rd G in/Y in
16	Phi2	--	Phase-2 filter	80	B3/Pb	I	3rd B in/Pb in
17	Phi1	--	Phase-1 filter	81	Gnd3	--	GND3
18	Gnd1	--	GND1	82	V5P3	--	3rd supply
19	SecPll	--	SECAM PLL Decoupling	83	BCL	I	BCL input
20	Dec8G	--	Bandgap decoupling	84	BLKIN	I	Black current input
21	Ewd/Avl	O	E/W Drive or AVL cap.	85	Rout	O	Red output
22	Vdb	O	V. Drive B output	86	Gout	O	Green output
23	Vda	O	V. Drive A output	87	Bout	O	Blue output
24	Vif1	I	IF input 1	88	V3.3A1	--	3.3V analog
25	Vif2	I	IF input 2	89	RefAdN	--	Negative ref. voltage
26	Vsc	--	Vertical sawtooth cap.	90	V3.3RefAdP	--	Positive ref. voltage
27	Iref	I	Ref. current input	91	RefAd	--	Reference voltage for ADC
28	GndIF	--	GND IF	92	GndA	--	GND
29	Sif1	I	SIF input 1 / DVB input 1	93	V1.8A	I	Supply for ADC
30	Sif2	I	SIF input 2 / DVB input 2	94	V3.3A2	I	Supply for SDAC
31	Agc	O	Tu AGC output	95	VssADC	--	GND for Temp. sensor
32	EHT	I	EHT/overvoltage protect	96	V1.8ADC	--	Supply video ADC
33	Ssif/RefIn/Avl/RefOut	O	L/OTHER	97	IntO	I	REMOCON
34	AudioIn5L	I	Audio 5 input (Left)	98	P10/Int1	I	AV_LINK IN
35	AudioIn5R	I	Audio 5 input (Right)	99	P11/TO	O	AV_LINK OUT
36	AudOutSL	O	Audio output (Left)	100	V1.8C2	--	digital 1.8V
37	AudOutSR	O	Audio output (Right)	101	VssC2	--	GND
38	DecsDem	--	decoupling sound demod.	102	P04/I2SWs	I/O	(I2S_WS)
39	QssO/AmO/AudeEm	O	QSSO/AMout/deemphasis	103	P03/I2SClk	I/O	(I2S_CLK)
40	Gnd2	--	GND2	104	P02/I2SDo2	O	L/R_OTH (I2S_Dout2)
41	Pllf	--	IF PLL loop filter	105	P01/I2SDo1	O	D/A_RST (I2S_Dout1)
42	SifAgc	--	AGC SIF / int-extAGCforDVB	106	P00/I2SDI1	I	H/P DET
43	IfVo/FmRo/DvbO	O	DVBout/IFvideo/FMout	107	P13/T1	O	POWER
44	FmRo/DvbO	O	DVBout/FMout	108	SCL1	I/O	SCL1
45	V8AudioSwitches	--	8V for Audio SW.	109	SDA1	I/O	SDA1
46	AgcSsif	--	AGC cap.2nd SIF	110	V3.3P	--	3.3V
47	V5P2	--	2nd supply 5V	111	P20/TPwm	O	ROTATION (or N/S CANCEL)
48	SVO/IfVo/Cvbsl	I/O	IF vout/seiCVBSO/CVBSin	112	P21/Pwm0	O	(N/S_CEN/OTH)
49	Audio4InL	I	Audio 4 input (Left)	113	P22/Pwm1	O	A_MUTE
50	Audio4InR	I	Audio 4 input (Right)	114	P23/Pwm2	O	AMP_MUTE
51	Y4/Cvbs4	I	CVBS4/Y4 input	115	P30/Adc0	I	PROTECT
52	C4	I	Chroma-4 input	116	P31/Adc1	O	LED
53	Audio2InL	I	Audio 2 input (Left)	117	V1.8C1	--	1.8V digital
54	Audio2InR	I	Audio 2 input (Right)	118	DecV1V8	--	Decoupling 1.8V
55	Cvbs2/Y	I	CVBS2/Y2 input	119	P32/Adc2	I	KEY input
56	Audio3InL	I	Audio 3 input (Left)	120	P33/Adc3	I	AGC input (ECO)
57	Audio3InR	I	Audio 3 input (Right)	121	VssC1+P1	I	Digital GND m controller
58	Y3/Cvbs	I	CVBS3/Y3 input	122	P24/PWM3	O	NC(SAW_SW)
59	C3	I	Chroma-2/3 input	123	P25/PWM4	O	RES_OUT
60	AudOutLsL	I	Audio output for AMP	124	V1.8C3	--	1.8V digital
61	AudOutLsR	I	Audio output for AMP	125	VssC3	--	GND
62	AudOutHpL	I	HP L Audio output	126	P12/Int2	I	POW_DET
63	AudOutHpR	I	HP-R Audio output	127	P14/RX	I/O	SDA0
64	CVBSO/PIP	I/O	CVBS/PIP output	128	P15/TX	I/O	SCL0

SECTION 3 DISASSEMBLY

3.1 DISASSEMBLY PROCEDURE

The illustration of Fig.5 is explained about AV-28R4SK/AV-32R4SK.

In case of AV-28T Series or AV-32T Series MODELS, you disassemble in the same procedure using Fig.6.

3.1.1 REMOVING THE REAR COVER

- (1) Unplug the power plug.
- (2) Remove the sub woofer cord from the AV TERMINAL BOARD.
- (3) Remove the SUB WOOFER UNIT on the top of the rear cover upward.
- (4) Remove the 13 screws [A] as shown in Fig.5.
- (5) Withdraw the REAR COVER toward you.

3.1.2 REMOVING THE SIDE CONTROL JACK ASSY

- Remove the REAR COVER.
- (1) Remove the screw [B] as shown in Fig.5.
- (2) Slightly pull the SIDE CONTROL JACK ASSY toward you, and detach the claw from FRONT CABINET. Then it can be removed.
- (3) Then disconnect the connector [S], [F] and [K] as shown in Fig 1.

3.1.3 REMOVING THE SIDE CONTROL PWB

- Remove the REAR COVER.
- Remove the SIDE CONTROL JACK ASSY.
- (1) Remove the 3 claws [C] from backside of the SIDE CONTROL JACK ASSY as shown in Fig.1.
- (2) Remove the SIDE CONTROL PWB from the SIDE CONTROL JACK ASSY.

3.1.4 REMOVING THE AV TERMINAL BOARD

- Remove the REAR COVER.
- (1) Remove the 5 screws [G] as shown in Fig. 5.
- (2) Remove the 2 claws [H] at the bottom of the AV TERMINAL BOARD as shown in Fig. 2.
- (3) Shift the AV TERMINAL BOARD slightly in the direction of arrow [I], and remove it as shown in Fig. 2.
- (4) At first, expand the lever [K] with the SUB WOOFER connector, and pull it out of connector jack as shown in Fig.3.

3.1.5 REMOVING THE MAIN CHASSIS

- Remove the REAR COVER.
- (1) Slightly raise the MAIN CHASSIS, and release the two claws at the bottom of and both sides of the MAIN CHASSIS.
- (2) Then withdraw the MAIN CHASSIS backward from the front cabinet. (If necessary, detach the wire clamp, connectors etc.)

3.1.6 REMOVING THE MAIN SPEAKER

- Remove the REAR COVER.
- (1) Remove the 2 screws [E], and detach the MAIN SPEAKER HOLDER as shown in Fig. 5. (When removing the screws [E] of the MAIN SPEAKER HOLDER, the lower side screw first, and then upper one.)
- (2) Remove the 4 screws [F], which attached the MAIN SPEAKER.
- (3) Follow the same steps when disassemble the other hand MAIN SPEAKER.

3.1.7 REMOVING THE CENTER SPEAKER

- Remove the REAR COVER.
- Remove the MAIN CHASSIS.
- (1) Remove the 2 screws [D] as shown in Fig. 5.
- (2) Remove the CENTER SPEAKER. If necessary, detach the cables.

3.1.8 CHECKING THE PW BOARD

- (1) Pull out the MAIN CHASSIS (Refer to REMOVING THE MAIN CHASSIS).
- (2) Erect the CHASSIS vertically with the HVT side facing up so that you can easily check the back side of the PW board.

3.1.9 CAUTION

- (1) When erecting the MAIN CHASSIS, be careful so that there will be no contacting with other PWB.
- (2) Before turning power on, make sure that the wire connector is properly connected.
- (3) When conducting a check with power supplied, be sure to confirm that the CRT EARTH WIRE (BRAIDED ASS'Y) is connected to the CRT SOCKET PWB.

3.1.10 WIRE CLAMPING AND CABLE TYING

- (1) Be sure to clamp the wire.
- (2) Never remove the cable tie used for tying the wires together. Should it be inadvertently removed, be sure to tie the wires with a new cable tie.

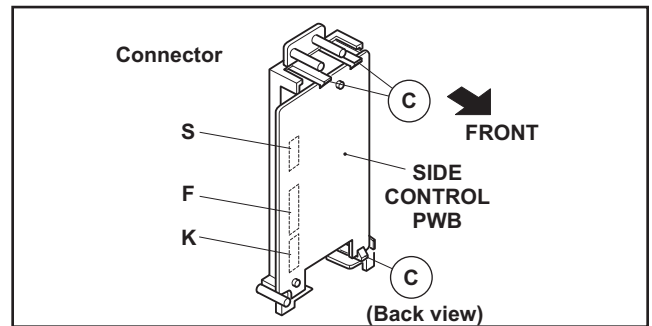


Fig.1

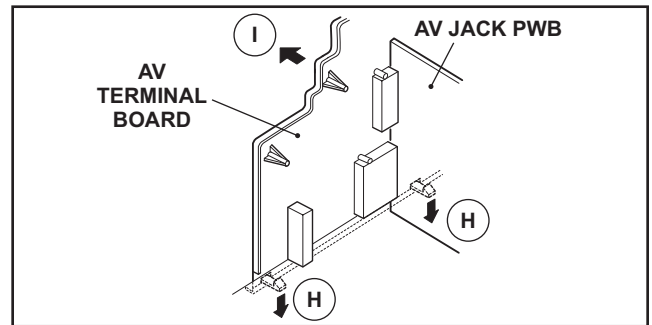


Fig.2

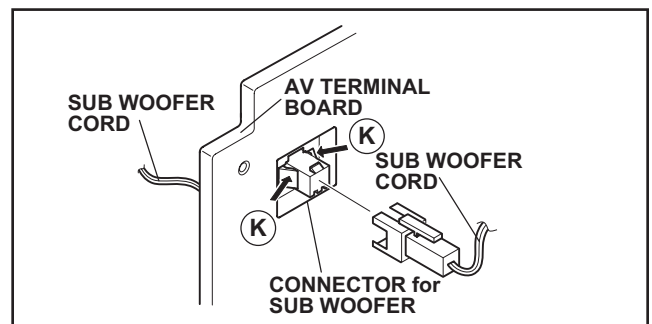


Fig.3

3.1.11 REMOVING THE SUB WOOFER UNIT [AV-28R4SK / AV-32R4SK]

- (1) Remove the 15 screws [L], remove the SP BOX B.
- (2) Remove the 4 screws [M], remove the SPEAKER.
- (3) Remove the 3 screws [N], remove BASS INT. DUCT.

CAUTION

- The woofer unit is mounted on the TV. Always move the TV and woofer unit together when removing the TV from the box, or when moving the woofer unit.
- If the TV is tilted during movement the woofer unit may fall. Be careful to keep the TV level when moving it.
- Do not grip the woofer unit when moving the TV.
- Do not place objects on the woofer unit duct.

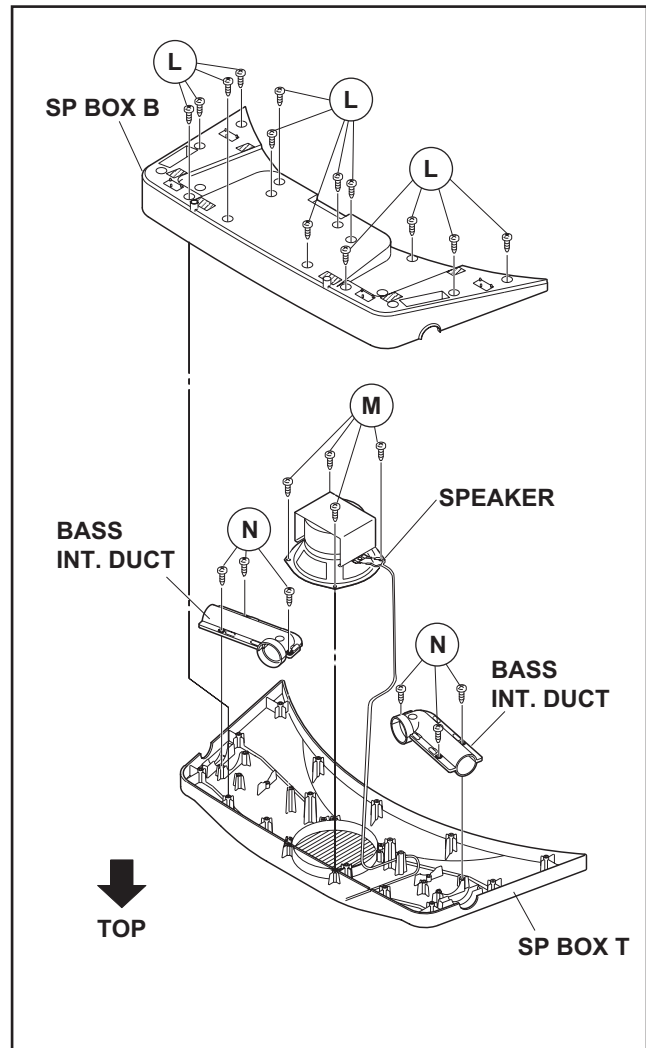
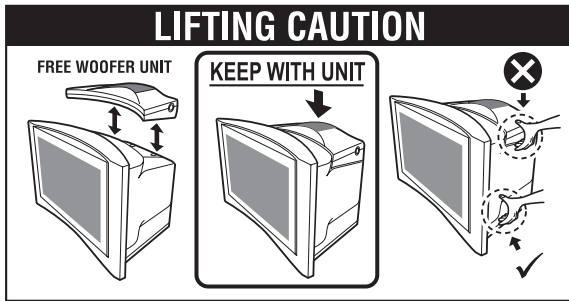


Fig.4

3.1.12 EXPLODED VIEW [AV-28R4SK and AV-32R4SK]

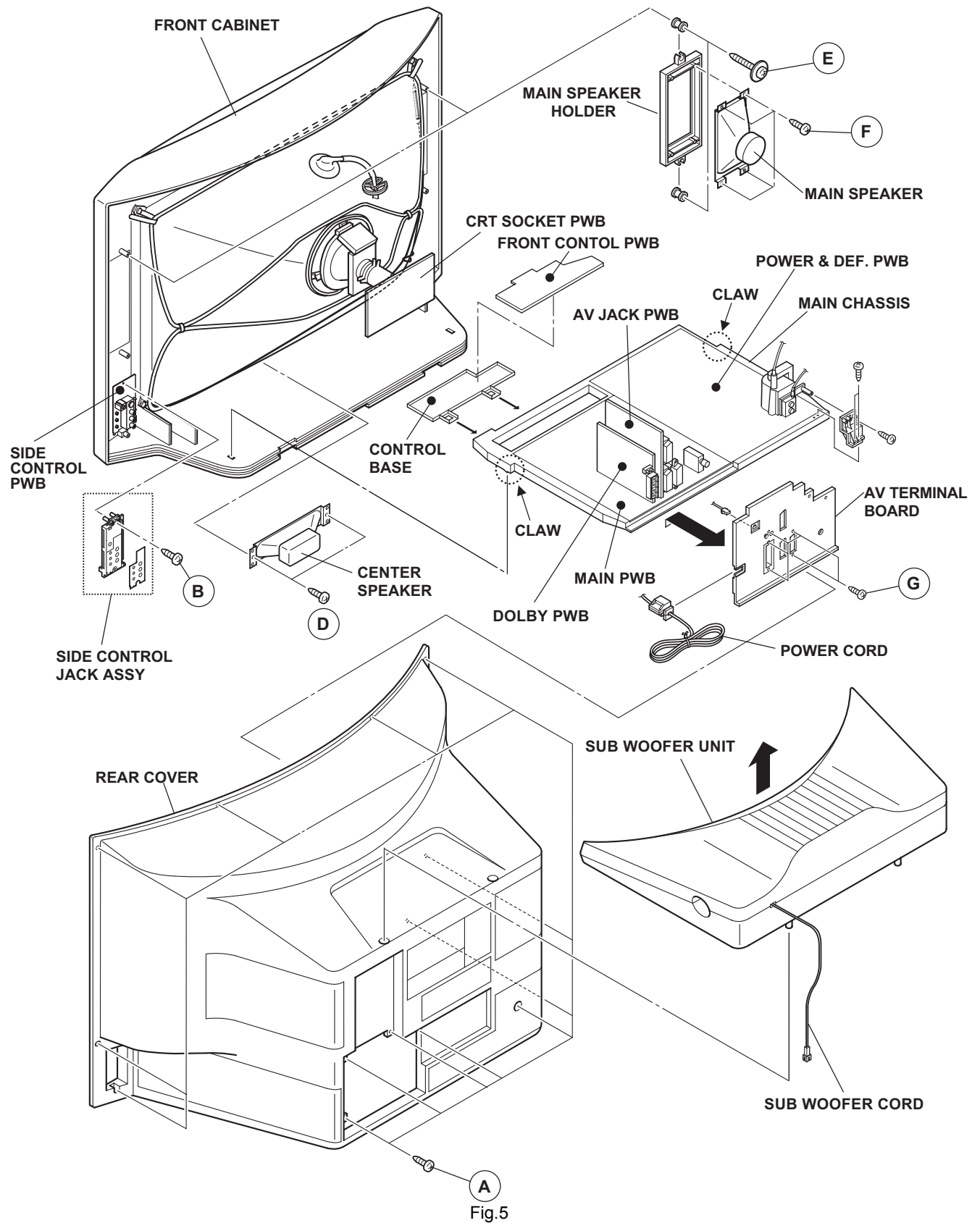
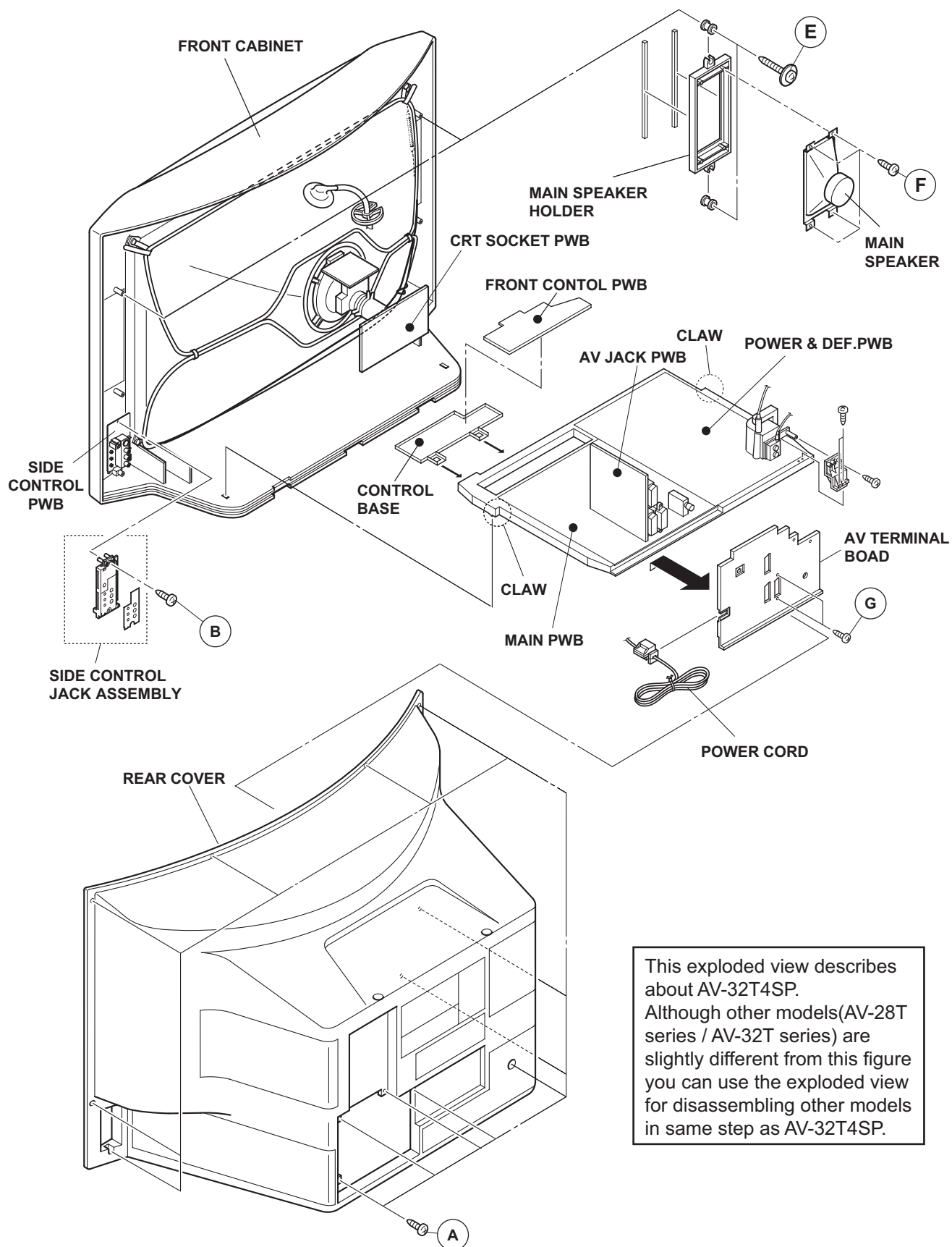


Fig.5

3.1.13 EXPLODED VIEW [AV-28T Series and AV-32T Series]



This exploded view describes about AV-32T4SP. Although other models(AV-28T series / AV-32T series) are slightly different from this figure you can use the exploded view for disassembling other models in same step as AV-32T4SP.

Fig.6

3.1.14 REMOVING THE CRT

NOTE:

- Replacement of the CRT should be performed by 2 or more persons.
 - After removing the REAR COVER, CHASSIS etc.,
- (1) Putting the CRT change table on soft cloth, the CRT change table should also be covered with such soft cloth (shown in Fig. 6).
 - (2) While keeping the surface of CRT down, mount the TV set on the CRT change table balanced will as shown in Fig. 6.
 - (3) Remove 4 screws marked by arrows with a box type screwdriver as shown in Fig. 7.

NOTE:

Since the cabinet will drop when screws have been removed, be sure to support the cabinet with hands.

- (4) After 4 screws have been removed, put the cabinet slowly on cloth (At this time, be carefully so as not to damage the front surface of the cabinet) shown in Fig. 8.

NOTE:

- The CRT should be assembled according to the opposite sequence of its dismantling steps.
- The CRT change table should preferably be smaller than the CRT surface, and its height be about 35cm.

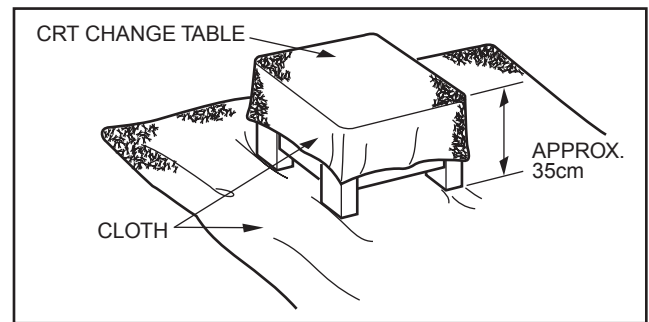


Fig.7

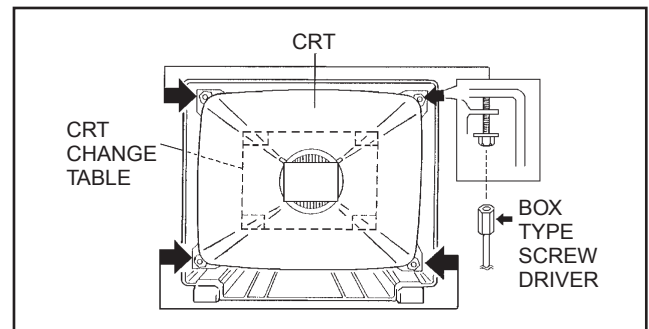


Fig.8

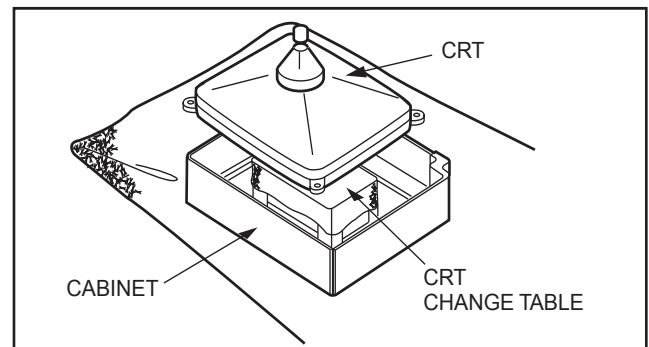


Fig.9

COATING OF SILICON GREASE FOR ELECTRICAL INSULATION ON THE CRT ANODE CAP SECTION.

Subsequent to replacement of the CRT and HV transformer or repair of the anode cap, etc. by dismantling them, be sure to coat silicon grease for electrical insulation as shown in Fig.9. Wipe around the anode button with clean and dry cloth. (Fig.9) Coat silicon grease on the section around the anode button. At this time, take care so that any silicon greases dose not sticks to the anode button. (Fig.10)

Silicon grease product No. KS - 650N

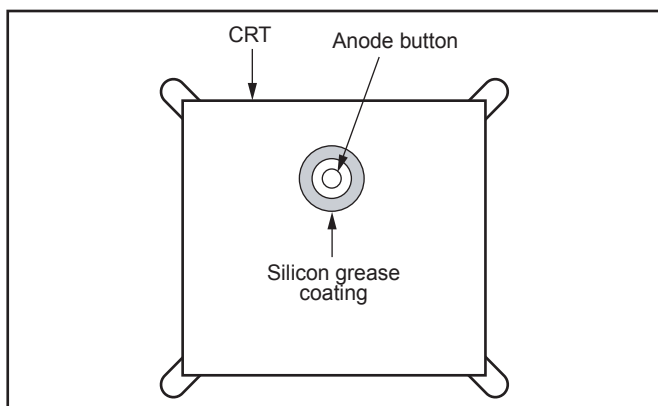


Fig.10

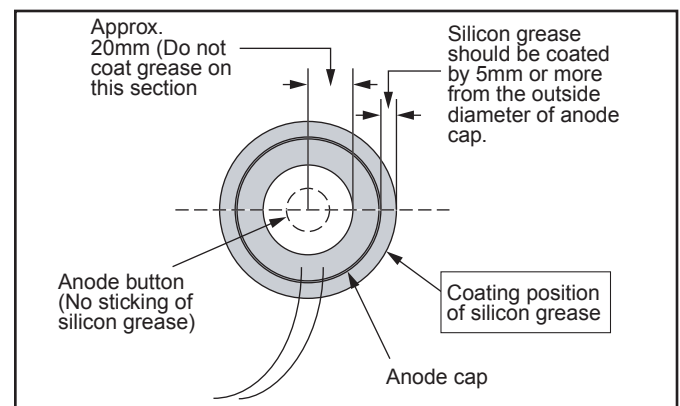


Fig.11

3.2 MEMORY IC REPLACEMENT

- This model uses the memory IC.
- This memory IC stores data for proper operation of the video and drive circuits.
- When replacing, be sure to use an IC containing this (initial value) data.

3.2.1 MEMORY IC REPLACEMENT PROCEDURE

1. Power off

Switch off the power and disconnect the power plug from the AC outlet.

2. Replace the memory IC

Be sure to use the memory IC written with the initial setting values.

3. Power on

Connect the power plug to the AC outlet and switch on the power.

4. System constant check and setting

* It must not adjust without signal.

- (1) Press the [INFORMATION] key and the [MUTING] key of the REMOTE CONTROL UNIT simultaneously.
- (2) The SERVICE MENU screen of Fig. 1 will be displayed.
- (3) While the SERVICE MENU is displayed, press the [INFORMATION] key and [MUTING] key simultaneously, and the SYSTEM CONSTANT SET screen of Fig. 2 will be displayed.
- (4) Refer to the "SETTING VALUES OF SYSTEM CONSTANT SET", and check the setting items. Where these differ, select the address with the [FUNCTION (UP/DOWN)] key and adjust it with the [FUNCTION (RIGHT/LEFT)] keys. (The letter of the selected item is displayed in yellow.)
- (5) A setup will become effective if the main power is shut off.

5. Receiving channel setting

Refer to the OPERATING INSTRUCTIONS and set the receive channels (Channels Preset) as described.

6. User settings

Check the user setting items according to the given in page later.

Where these do not agree, refer to the OPERATING INSTRUCTIONS and set the items as described.

7. SERVICE MENU setting

Verify what to set in the SERVICE MENU, and set whatever is necessary (Fig.1). Refer to the SERVICE ADJUSTMENT for setting.

SERVICE MENU	
1. IF	2. V/C
3. AUDIO	4. DEF
5. VSM PRESET	6. VPS
7. SHIPPING (OFF)	
MODEL=JW EURO (XXXXX)	

Fig.1

EEP EDIT (LAST MEMORY) TOP ADDRESS=000H									
Address	Setting data								
	<table border="1"> <tr> <td>00 01</td><td>02 03 04 05 06 07</td></tr> <tr> <td>8F 00</td><td>FE FF FF FF FF FF</td></tr> <tr> <td>08 09 0A 0B 0C 0D 0E 0F</td><td></td></tr> <tr> <td>FF 01 BB FC 1F F9 FF FF</td><td></td></tr> </table>	00 01	02 03 04 05 06 07	8F 00	FE FF FF FF FF FF	08 09 0A 0B 0C 0D 0E 0F		FF 01 BB FC 1F F9 FF FF	
00 01	02 03 04 05 06 07								
8F 00	FE FF FF FF FF FF								
08 09 0A 0B 0C 0D 0E 0F									
FF 01 BB FC 1F F9 FF FF									
	Do not adjust								

Fig.2

NAME OF REMOTE CONTROL KEY

Names of key	key
INFORMATION	
MUTING	
MENU	
FUNCTION UP/DOWN	
FUNCTION +/-	

3.2.2 SYSTEM CONSTANT SETTING

Address	Setting data									
	AV-28R4SK	AV-28T4SK AV-28T4BK	AV-28T4SP	AV-28T4SR AV-28T4BR	AV-28T77SK	AV-32R4SK	AV-32T4SK	AV-32T4SP	AV-32T4SR	AV-32T77SK
00	8F	8B	CF	CF	89	9F	9B	DF	DF	99
01	00	00	02	01	00	00	00	02	01	00

3.2.3 SETTINGS OF FACTORY SHIPMENT

3.2.3.1 BUTTON OPERATION

Setting item	Setting position
POWER	Off
CHANNEL	PR1
VOLUME	10

3.2.3.2 REMOTE CONTROL DIRECT OPERATION

Setting item	Setting position
CHANNEL	PR1
VOLUME	10
ZOOM	PANORAMIC
3D SOUND	OFF

3.2.3.3 REMOTE CONTROL MENU OPERATION

(1) PICTURE

Setting item	Setting position
PICTURE MODE	STANDARD
CONTRAST / BRIGHT SHARP / COLOUR / HUE	Refer to [5. VSM PRESET]
COLOUR TEMP.	NORMAL
FEATURES	
AUTO VNR	AUTO
COLOUR SYSTEM	TV According to preset CH
	EXT AUTO
4:3 AUTO ASPECT	PANORAMIC

(2) SOUND

Setting item	Setting position
STEREO / I·II	Stereo sound
BASS	Centre
TREBLE	Centre
BALANCE	Centre
HYPER SOUND	OFF
DOLBY VIRTUAL [AV-28T77SK/AV-32T77SK]	OFF
TV SPEAKER [AV-28R4SK/AV-32R4SK]	ON
SUROUND MODE [AV-28R4SK/AV-32R4SK]	
DOLBY PRO LOGIC II	TV SPEAKER L / C / R
	LEFT MAX
	CENTRE MAX
	RIGHT MAX
	LS MAX
	RS MAX
	WOOFER MAX
	DISTANCE 0

(3) FEATURES

Setting item	Setting position
SLEEP TIMER	OFF
BLUE BACK	ON
CHILD LOCK	Refer to OPERATION INSTRUCTIONS

(4) SET UP

Setting item	Setting position
AUTO PROGRAM	TV channel automatically set
EDIT/MANUAL	PRESET CH only The others : BLANK
LANGUAGE	ENGLISH
DECODER (EXT-2)	OFF
EXT SETTING	ID BLANK
	S-IN BLANK
	DUBBING EXT-1 → EXT-2
PICTURE TILT	MIDDLE

3.2.4 SERVICE MENU SETING ITEMS

Setting item	Setting value	Setting item	Setting value	
1. IF	1. VCO 2. DELAY POINT	5. VSM PRESET	BRIGHT/SOFT/STD	COOL/WARM/NOMAL
			1.BRIGHT 2.CONT. 3.COLOUR 4.SHARP 5.HUE	1.WDR R 2.WDR G 3.WDR B
2. V / C	1.SCREEN 2.CUTOFF R / G 3.WDR R / G / B 4.BRIGHT 5.CONT. 6.COLOUR 7.HUE 8.BLACK OFFSET B-Y 9.SHARP 10.Y-DELAY 11.TINT DVD 12.RGB BLK	6.VPS (Do not adjust)	VPS PDC WSS SN	
3. AUDIO (Do not adjust)	1.DCX0 ADJ. 2.ERROR LIMIT 3.A2 ID THR	7.SHIPPING (Do not adjust)	ON/OFF	
4. DEF.	1.V-SHIFT 2.V-SLOPE 3.V-SIZE 4.H-CENT 5.H-SIZE 6.TRAPEZ 7.EW-PIN 8.COR-UP 9.COR-LOW 10.ANGLE 11.BOW 12.V-S.CR 13.V-LIN			

3.3 REPLACEMENT OF CHIP COMPONENT

3.3.1 CAUTIONS

- (1) Avoid heating for more than 3 seconds.
- (2) Do not rub the electrodes and the resist parts of the pattern.
- (3) When removing a chip part, melt the solder adequately.
- (4) Do not reuse a chip part after removing it.

3.3.2 SOLDERING IRON

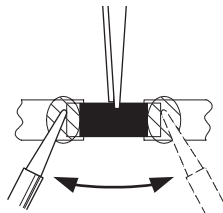
- (1) Use a high insulation soldering iron with a thin pointed end of it.
- (2) A 30w soldering iron is recommended for easily removing parts.

3.3.3 REPLACEMENT STEPS

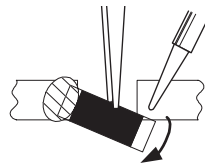
1. How to remove Chip parts

[Resistors, capacitors, etc.]

- (1) As shown in the figure, push the part with tweezers and alternately melt the solder at each end.



- (2) Shift with the tweezers and remove the chip part.

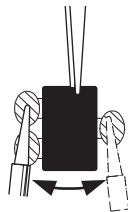


[Transistors, diodes, variable resistors, etc.]

- (1) Apply extra solder to each lead.



- (2) As shown in the figure, push the part with tweezers and alternately melt the solder at each lead. Shift and remove the chip part.



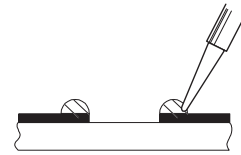
NOTE :

After removing the part, remove remaining solder from the pattern.

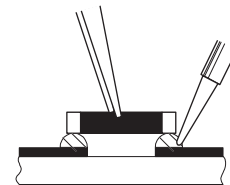
2. How to install Chip parts

[Resistors, capacitors, etc.]

- (1) Apply solder to the pattern as indicated in the figure.

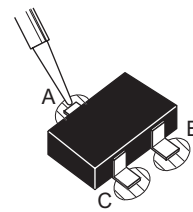


- (2) Grasp the chip part with tweezers and place it on the solder. Then heat and melt the solder at both ends of the chip part.

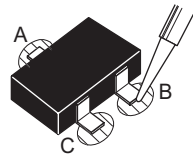


[Transistors, diodes, variable resistors, etc.]

- (1) Apply solder to the pattern as indicated in the figure.
- (2) Grasp the chip part with tweezers and place it on the solder.
- (3) First solder lead **A** as indicated in the figure.



- (4) Then solder leads **B** and **C**.



SECTION 4 ADJUSTMENT

4.1 ADJUSTMENT PREPARATION

- (1) There are 2 ways of adjusting this TV : One is with the **REMOTE CONTROL UNIT** and the other is the conventional method using adjustment parts and components.
- (2) The adjustment using the **REMOTE CONTROL UNIT** is made on the basis of the initial setting values. The setting values which adjust the screen to the optimum condition can be different from the initial setting values.
- (3) Make sure that connection is correctly made AC to AC power source.
- (4) Turn on the power of the TV and measuring instruments for warming up for at least 30 minutes before starting adjustments.
- (5) If the receive or input signal is not specified, use the most appropriate signal for adjustment.
- (6) Never touch the parts (such as variable resistors, transformers and condensers) not shown in the adjustment items of this service adjustment.

4.2 PRESET SETTING BEFORE ADJUSTMENT

Unless otherwise specified in the adjustment items, preset the following functions with the **REMOTE CONTROL UNIT**.

Item	Preset value
PICTURE MODE	STD
COLOUR TEMP.	NORMAL
BASS / TREBLE / BALANCE	Centre
ZOOM	FULL
SLEEP TIMER	OFF

4.3 MEASURING INSTRUMENT AND FIXTURES

- (1) DC voltmeter (or digital voltmeter)
- (2) Oscilloscope
- (3) Signal generator
(Pattern generator : PAL / SECAM / NTSC)
- (4) Remote control unit

4.4 ADJUSTMENT ITEMS

■ CHECK ITEM

- B1 POWERSUPPLY check
- HIGH VOLTAGE check
- IF VCO check

■ FOCUS

- FOCUS adjustment

■ DEFLECTION CIRCUIT

- V. POSITION adjustment
- V. SIZE adjustment
- H. POSITION adjustment
- H. SIZE adjustment
- SIDE-PIN adjustment
- TRAPEZIUM adjustment
- CORNER adjustment
- ANGLE adjustment
- BOW adjustment
- V. S-SHAPE CORRECTION & V.LINEARITY adjustment

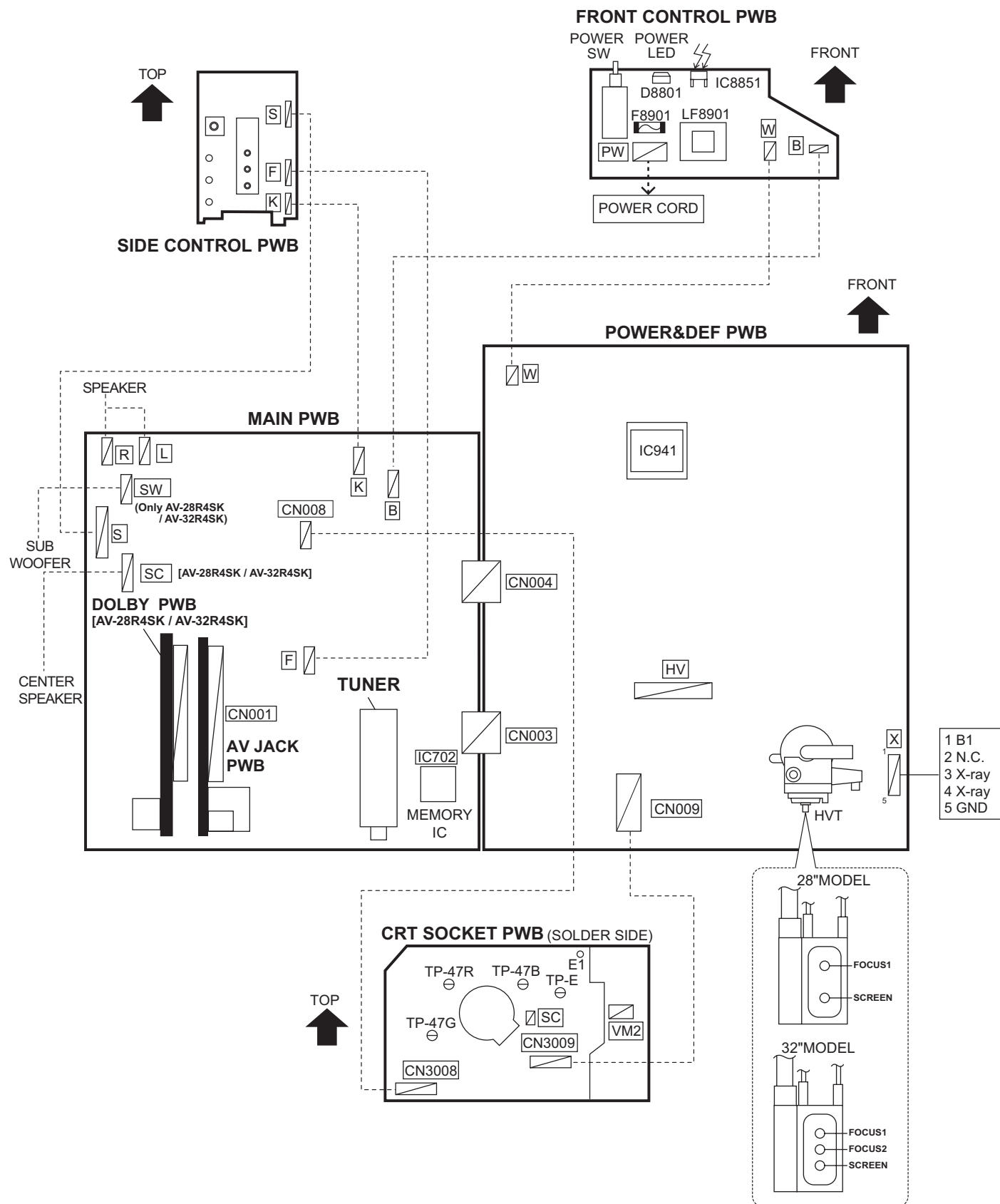
■ VIDEO CIRCUIT

- WHITE BALANCE adjustment
- SUB BRIGHT adjustment
- SUB CONTRAST adjustment
- SUB COLOUR-1 adjustment
- SUB COLOUR-2 adjustment
- SUB HUE-1 adjustment
- SUB HUE-2 adjustment
- SECAM BLACK OFFSET adjustment

■ VSM PRESET SETTING

- VSM PRESET setting

4.5 ADJUSTMENT LOCATIONS



4.6 BASIC OPERATION OF SERVICE MENU

4.6.1 TOOL OF SERVICE MENU OPERATION

Operate the SERVICE MENU with the REMOTE CONTROL UNIT.

4.6.2 SERVICE MENU ITEMS

With the SERVICE MENU, various adjustments can be made, and they are broadly classified in the following items of settings.

1.IF	This mode adjusts the setting values of the IF circuit.
2.V/C	This mode adjusts the setting values of the VIDEO / CHROMA circuit.
3.AUDIO	This mode adjusts the setting values of the multiplicity SOUND circuit. [Do not adjust]
4.DEF	This mode adjusts the setting values of the DEFLECTION circuit for each aspect mode given below.
5.VSM PRESET	This mode adjusts the initial setting values of COOL, NORMAL and WARM. (VSM : Video Status Memory)
6.VPS	This mode shows the monitor of the VPS, PDC, WSS and SN. [Do not adjust]
7.SHIPPING(OFF)	This mode is set at shipping. [Do not adjust]

4.6.3 BASIC OPERATION OF SERVICE MENU

(1) HOW TO ENTER SERVICE MENU

Press the [INFORMATION] key and the [MUTING] key of the REMOTE CONTROL UNIT simultaneously, and the SERVICE MENU screen of Fig.1 will be displayed.

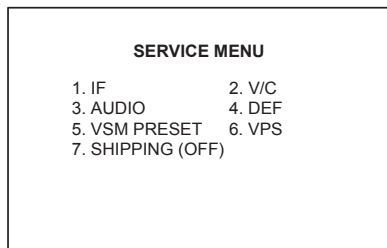


Fig.1

(2) SELECTION OF SUB MENU SCREEN

Press one of [1] - [5] keys of the REMOTE CONTROL UNIT and select the SUB MENU SCREEN (See "SERVICE MENU FLOW CHART"), from the SERVICE MENU.

NAME OF REMOTE CONTROL KEY	
Names of key	Key
INFORMATION	
MUTING	
MENU	
FUNCTION UP/DOWN	
FUNCTION +/-	

Fig.2

(3) METHOD OF SETTING

● 1.IF

[1.VCO] : It must not adjust without signal.

Key	Function
(1) [1]	Select 1.IF
(2) [1]	Select 1.VCO (CW) Make sure that the arrow position between the ABOVE REF and BELOW REF.
(3) [INFORMATION]	Return to the SERVICE MENU screen.

● 2.V/C, 4.DEF AND 5.VSM PRESET.

Key	Function
(1) [2] / [3] / [4] / [5]	Select one from 2.V/C, 4.DEF and 5.VSM PRESET.
(2) [FUNCTION UP / DOWN (▲/▼)]	Select setting items.
(3) [FUNCTION +/- (◀/▶)]	Set (adjust) the setting values of the setting items.
(4) [OK]	Memorize the setting value.(Before storing the setting values in memory, do not press the CH, TV, POWER ON / OFF key if you do, the values will not be stored in memory.)
(5) [INFORMATION]	Return to the SERVICE MENU screen.

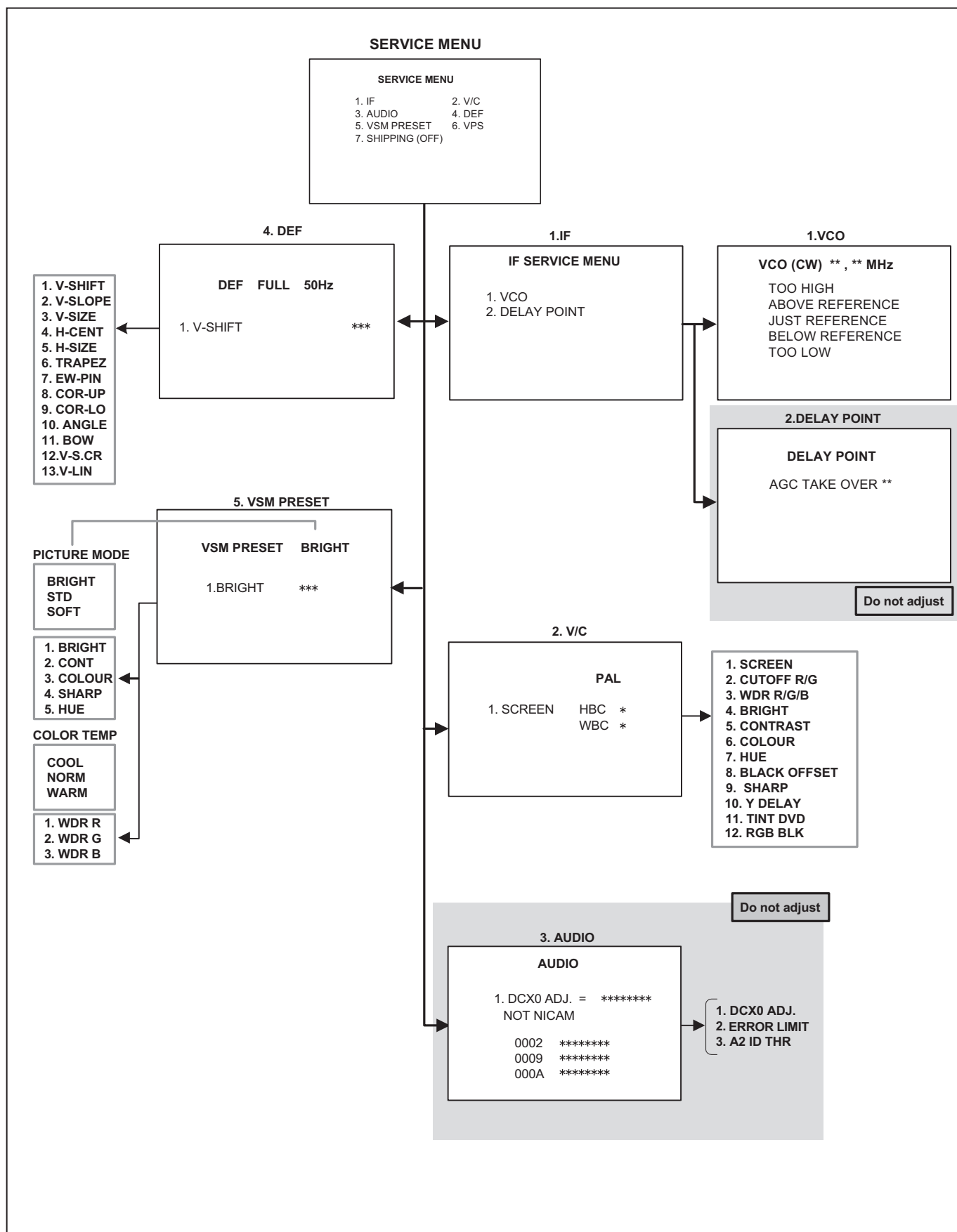
● 3.AUDIO, 6.VPS, and 7.SHIPPING.

[Do not setting]

(4) RELEASE OF SERVICE MENU

After completing the setting, return to the SERVICE MENU, then again press the [INFORMATION] key.

4.6.4 SERVICE MENU FLOW CHART



4.7 INITIAL SETTING VALUE OF SERVICE MENU

- (1) Adjustment of the SERVICE MENU is made on the basis of the initial setting values. However, the new setting values which displays on the screen in its optimum condition may differ from the initial setting value.
- (2) Do not change the initial setting values of the items not listed in "ADJUSTMENT PROCEDURE".
- (3) "---" is impossible to adjust or not requirement to adjustment.

4.7.1 [2. V/C]

Setting item		Variable range	Setting value				
			PAL	SECAM	NTSC	NTSC4.43	RGB
2. CUT OFF	RED	-63~+63	0	0	0	0	0
	GREEN	-63~+63	0	0	0	0	0
3. WDR	RED	-63~+63	0	0	0	0	0
	GREEN	-63~+63	0	0	0	0	0
	BLUE	-63~+63	0	0	0	0	0
4. BRIGHT		-63~+63	0	0	0	0	0
5. CONTRAST		-63~+63	-10	-10	-10	-10	0
6. COLOUR		-63~+63	0	0	0	0	0
7. HUE		-63~+63	---	---	0	0	---
8. BLACK OFFSET	B-Y	0~3	---	3	---	---	---

Setting item	Variable range	Setting value								
		PAL		SECAM		NTSC		NTSC4.43		RGB
		RF	VIDEO	RF	VIDEO	RF	VIDEO	RF	VIDEO	
9. SHARP	-63~+63	+5	+5	+5	+5	+5	+5	+5	+5	+5

Setting item	Variable range	Setting value												
		PAL			SECAM			NTSC			NTSC4.43			RGB
		RF	VIDEO	S	RF	VIDEO	S	RF	VIDEO	S	RF	VIDEO	S	
10. Y DELAY	-63~+63	+5	+5	+5	+5	+5	+5	+5	+5	+5	+5	+5	+5	+5

Setting item		Variable range	Setting value				
			PAL	SECAM	NTSC	NTSC4.43	RGB
11. TINT DVD		-63~+63	0	0	0	0	0
12. RGB BLK		---	---	---	---	---	---

4.7.2 [3. AUDIO] [Do not adjust]

Setting item	Variable range	Setting value
1. DCXO ADJ.	---	F0
2. A2 ID THR	000H~FF0H	B0
3. ERR LIMIT	00H~FFH	00

4.7.3 [4. DEF]

Setting item	Variable range	Initial setting value											
		FULL		PANORAMIC		SUBTITLE		14:9 ZOOM		REGULAR		COMPRESS	
		50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz
1.V-SHIFT	-32~+31	±0	+3	+3	±0	-12	±0	±0	±0	±0	±0	±0	±0
2.V-SLOPE	-32~+31	±0	±0	±0	±0	±0	±0	±0	±0	±0	±0	±0	±0
3.V-SIZE	-32~+31	±0	-1	+5	±0	+20	±0	+14	±0	±0	±0	-32	±0
4.H-CENT	-32~+31	+8	5	-2	±0	±0	±0	±0	±0	±0	±0	+11	±0
5.H-SIZE	-32~+31	+18	±0	+9	±0	±0	±0	±0	±0	±0	±0	±0	±0
6.TRAPEZ	-32~+31	-4	±0	±0	±0	+2	±0	±0	±0	±0	±0	±0	±0
7.EW-PIN	-32~+31	-15	±0	±0	±0	±0	±0	±0	±0	±0	±0	±0	±0
8.COR-UP	-32~+31	±0	±0	±0	±0	±0	±0	±0	±0	±0	±0	±0	±0
9.COR-LO	-32~+31	±0	±0	±0	±0	+7	±0	±0	±0	±0	±0	±0	±0
10.ANGLE	-32~+31	±0	±0	±0	±0	±0	±0	±0	±0	±0	±0	±0	±0
11.BOW	-32~+31	±0	±0	±0	±0	±0	±0	±0	±0	±0	±0	±0	±0
12.V.S-COR	-32~+31	-14	±0	+10	±0	+4	±0	±0	±0	±0	±0	±0	±0
13.V.LIN	-32~+31	+3	±0	+6	±0	+8	±0	±0	±0	±0	±0	±0	±0

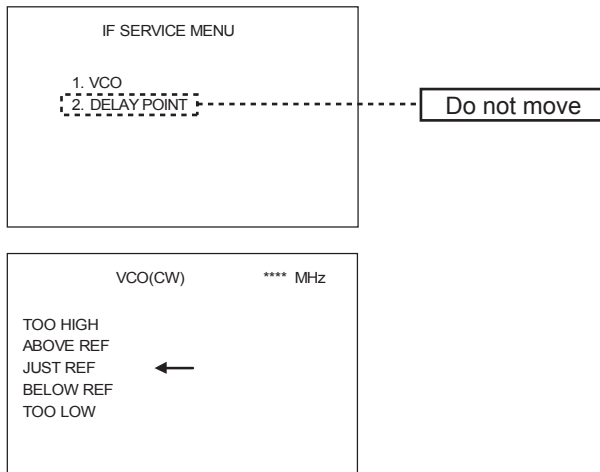
4.7.4 [5. VSM PRESET]

Item	Variable range	Setting value					
		PICTURE MODE			COLOUR TEMP.		
		BRIGHT	STANDARD	SOFT	COOL	NORMAL	WARM
1.BRIGHT	-16~+16	+0	+0	+0	---	---	---
2.CONT	-16~+16	+12	+10	+2	---	---	---
3.COLOUR	-16~+16	+6	+0	-2	---	---	---
4.SHARP	-16~+16	+0	+0	-2	---	---	---
5.HUE	-16~+16	+0	+0	+0	---	---	---
1.WDR R	-64~+64	---	---	---	-8	+7	+0
2.WDR G	-64~+64	---	---	---	+0	+0	+0
3.WDR B	-64~+64	---	---	---	+9	-6	+0

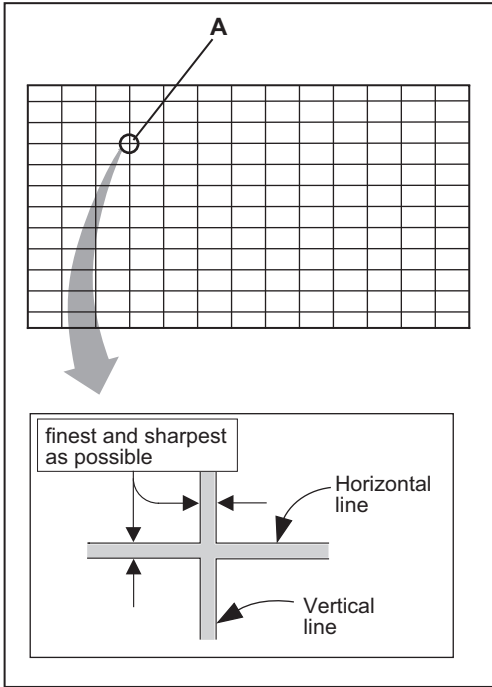
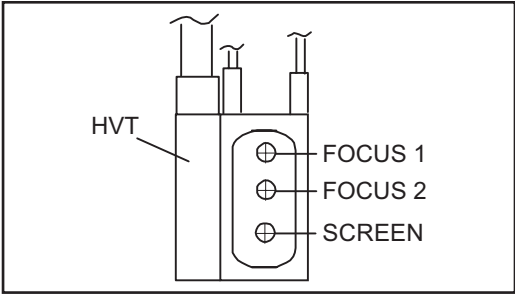
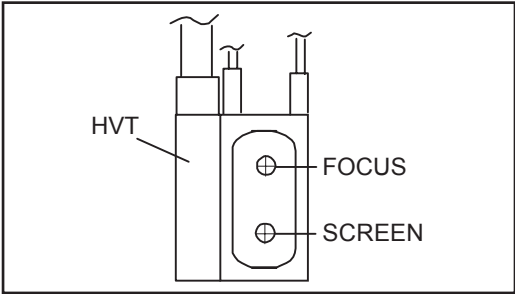
4.8 ADJUSTMENT PROCEDURE

4.8.1 CHECK ITEM

Item	Measuring instrument	Test point	Adjustment part	Description
B1 POWER SUPPLY check	Signal generator DC voltmeter Remote control unit	X connector TP-91(B1) TP-E [POWER DEF PWB]	[2.V/C] 12.RGB BLK	(1) Receive the any broadcast. (2) Select 2. V/C from the SERVICE MENU. (3) Select < 12. RGB BLK >. (4) Press the [FUNCTION + (▶)] key to find the cut off screen (Black screen). (5) Connect a DC voltmeter to TP-91(B1) and TP-E. (6) Make sure that the voltage is DC143V ± 2.0V. (7) Press the [FUNCTION - (◀)] key to return to service menu.
HIGH VOLTAGE check	Signal generator HV voltmeter Remote control unit	CRT anode Chassis GND	[2.V/C] 12.RGB BLK	(1) Receive the any broadcast. (2) Select 2. V/C from the SERVICE MENU. (3) Select < 12. RGB BLK >. (4) Press the [FUNCTION + (▶)] key to find the cut off screen (Black screen). (5) Connect a HV voltmeter to CRT ANODE and chassis GND. (A ground side is connected previously) (6) Make sure that the voltage is DC 31.0kV (+1kV / -1.5kV). (7) Press the [FUNCTION - (◀)] key to return to service menu. NOTE: When removing a prove, an anode side is removed previously.
IF VCO check	Remote control unit		[1.IF] 1.VCO	- Under normal conditions, no adjustment is required. - It must not adjust without broadcast signal. (1) Receive the any broadcast. (2) Select 1.IF from the SERVICE MENU. (3) Select < 1.VCO >. (4) Check the ←(arrow) position between the ABOVE REF. and BELOW REF.



4.8.2 FOCUS

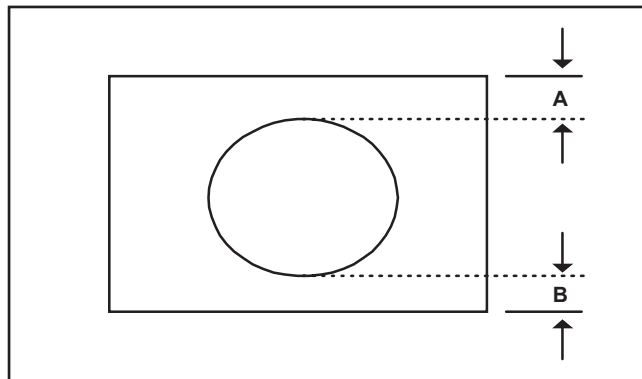
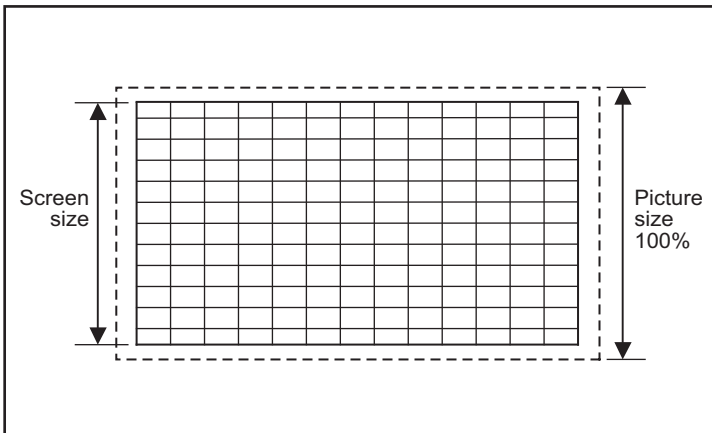
Item	Measuring instrument	Test point	Adjustment part	Description
FOCUS [32" MODELS]	Signal generator		FOCUS 1 VR FOCUS 2 VR [In HVT]	(1) Receive the crosshatch signal. (2) Set the ZOOM mode to FULL. (3) By turning the FOCUS 2 VR, adjust the picture so that the A part vertical line may become thinnest (Fig.1) . (4) By turning the FOCUS 1 VR, adjust the picture so that the A part horizontal line may become uniform at the line centre and its periphery (Fig.1) . (5) Make sure that when the screen is darkened, the lines remain in good focus.
 Fig.1				
FOCUS [28" MODELS]	Signal generator		FOCUS VR [In HVT]	(1) Receive the cross-hatch signal. (2) Set the ZOOM mode to FULL. (3) While looking at the screen, adjust the FOCUS VR to the vertical and horizontal lines will be clear and infine detail. (4) Make sure that the picture is in focus even when the screen gets darkened.
				

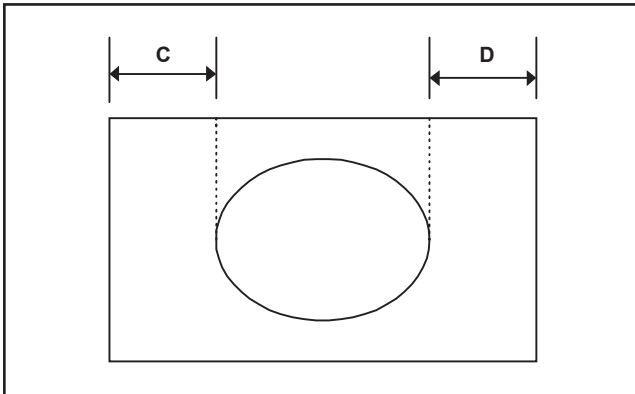
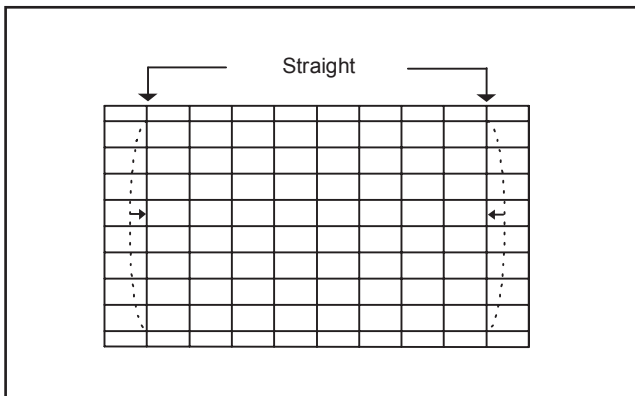
4.8.3 DEFLECTION CIRCUIT

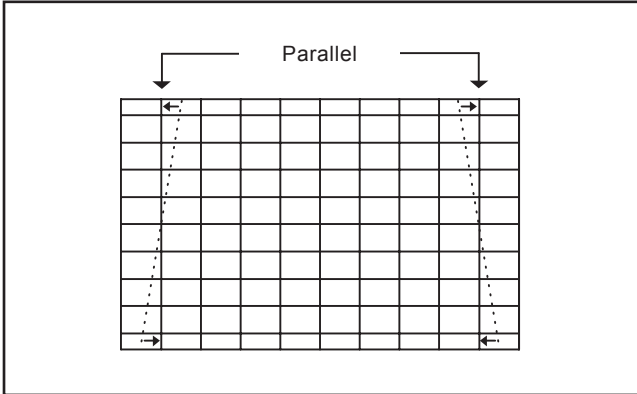
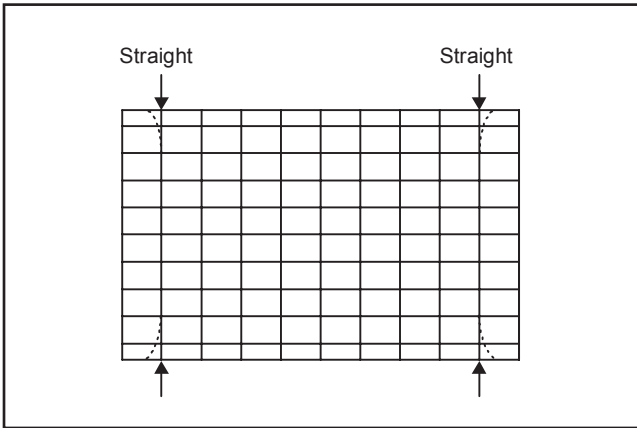
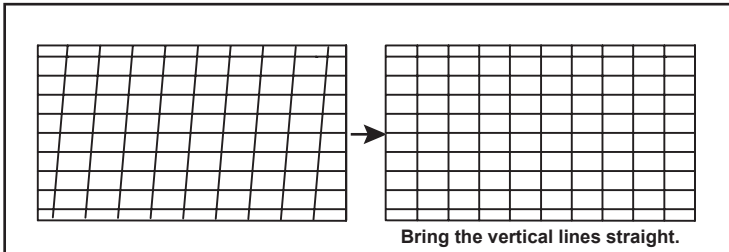
There are 6 aspect modes (1.FULL, 2.PANORAMIC, 3.SUBTITLE, 4.14:9 ZOOM 5.REGULAR 6.COMPRESS) of the adjustment. Depending upon the kind of signals.

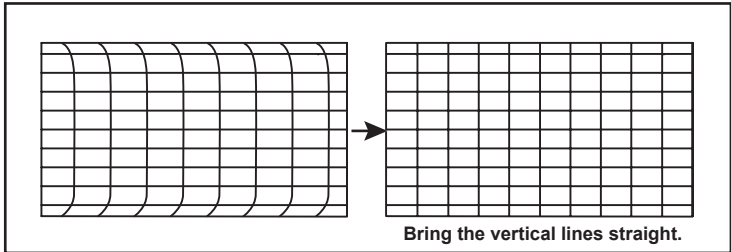
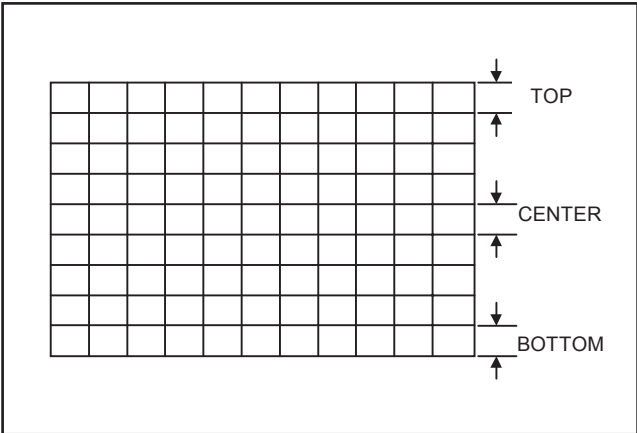
NOTE :

- At first the adjustment in 50Hz FULL mode should be done, then the data for the other aspect mode is corrected in the respective value at the same time. And confirm the deflection adjustment initial setting value in 60Hz (NTSC EXT mode) FULL mode. If the adjustment in 50Hz each aspect mode has been done and stored, the data for the same aspect modes in 60Hz is corrected in the respective value. Only the data for the other aspect mode in 60Hz is corrected for itself.

Item	Measuring instrument	Test point	Adjustment part	Description	
V. POSITION	Signal generator Remote control unit		[4.DEF] 1.V- SHIFT	(1) Receive the circle pattern signal of vertical frequency 50Hz (PAL / SECAM). (2) Set the ZOOM mode to FULL. (3) Select 4.DEF from the SERVICE MENU. (4) Select < 1.V-SHIFT >. (5) Set the initial setting value of < 1.V-SHIFT >. (6) Adjust vertical position to make A = B. (7) Check the adjustment value above in other zoom mode. If it is a wrong adjustment, re-adjust in FULL mode and adjust by < 1.V-SHIFT >. (8) Press the [MENU] key and memorize the set value.	
					
V. SIZE	Signal generator Remote control unit		[4.DEF] 3.V-SIZE	(1) Receive the cross-hatch signal. (2) Set the ZOOM mode to FULL. (3) Select 4.DEF from the SERVICE MENU. (4) Select < 3.V-SIZE >. (5) Set the initial setting value of < 3.V-SIZE >. (6) Adjust to make sure that the vertical screen size of the picture size is in the bellow table. (7) Make sure that the vertical screen size of the each ASPECT mode is in the below table. (8) Press the [MENU] key and memorize the set value. (9) Input a NTSC VIDEO signal (60Hz) from the EXT terminal, and make sure that the vertical screen size is in the table below. (10) Press the [MENU] key and memorize the set value.	
					
[SCREEN SIZE]					
ASPECT MODE	FULL	PANORAMIC	SUBTITLE	14:9 ZOOM	REGULAR
SCREEN TOP	92%	87%	70%	80%	92%
SCREEN BOTTOM	92%	87%	83%	80%	92%

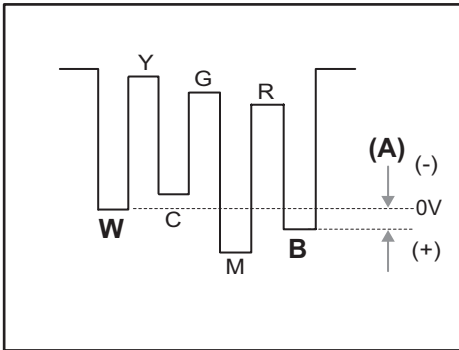
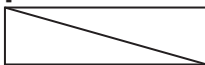
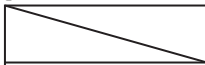
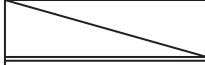
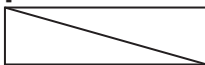
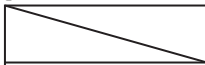
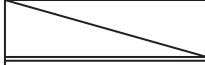
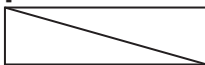
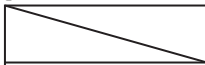
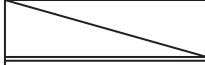
Item	Measuring instrument	Test point	Adjustment part	Description																		
H. POSITION	Signal generator		[4.DEF] 4.H-CENT	(1) Receive the circle pattern signal. (2) Set the ZOOM mode to FULL. (3) Select 4.DEF from the SERVICE MENU. (4) Select < 4.H-CENT >. (5) Set the initial setting value of < 4.H-CENT >. (6) Adjust horizontal position to make C=D. (7) Press the [MENU] key and memorize the set value.																		
	Remote control unit																					
																						
H. SIZE	Signal generator		[4.DEF] 5.H-SIZE	(1) Receive the circle pattern signal. (2) Set the ZOOM mode to FULL. (3) Select 4.DEF from the SERVICE MENU. (4) Select < 5.H-SIZE >. (5) Set the initial setting value of < 5.H-SIZE >. (6) Adjust to make sure that the horizontal screen size of the picture size is in the bellow table. (7) Make sure that the horizontal screen size of the each ASPECT mode is in the below table. (8) Press the [MENU] key and memorize the set value.																		
	Remote control unit																					
[SCREEN SIZE] <table><tr><th>MODE</th><th>FULL</th><th>PANORAMIC</th><th>SUBTITLE</th><th>14:9 ZOOM</th><th>REGULAR</th></tr><tr><td>28inch</td><td>91%</td><td>95% (94%)</td><td>92%</td><td>570mm</td><td>510mm</td></tr><tr><td>32inch</td><td>91%</td><td>95% (94%)</td><td>92%</td><td>495mm</td><td>450mm</td></tr></table>					MODE	FULL	PANORAMIC	SUBTITLE	14:9 ZOOM	REGULAR	28inch	91%	95% (94%)	92%	570mm	510mm	32inch	91%	95% (94%)	92%	495mm	450mm
MODE	FULL	PANORAMIC	SUBTITLE	14:9 ZOOM	REGULAR																	
28inch	91%	95% (94%)	92%	570mm	510mm																	
32inch	91%	95% (94%)	92%	495mm	450mm																	
SIDE-PIN	Signal generator		[4.DEF] 7.EW-PIN	(1) Receive the cross-hatch signal. (2) Set the ZOOM mode to FULL. (3) Select 4.DEF from the SERVICE MENU. (4) Select < 7.EW-PIN >. (5) Set the initial setting value of < 7.EW-PIN >. (6) Adjust to make the 2nd vertical lines at the left and right edges of the screen straight. Also make sure that the 3rd vertical lines are straight. (7) Press the [MENU] key and memorize the set value.																		
	Remote control unit																					
																						

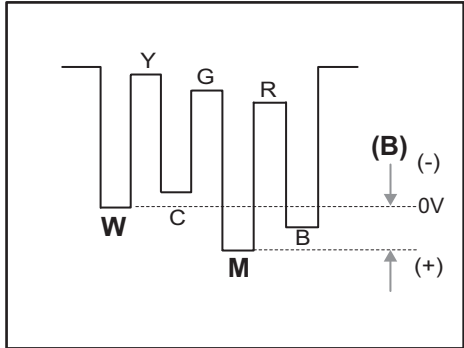
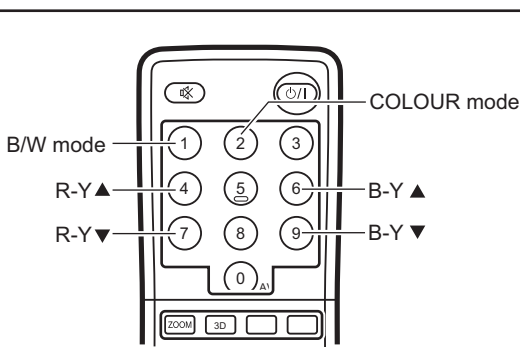
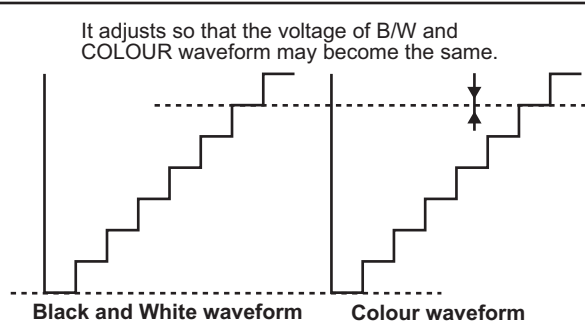
Item	Measuring instrument	Test point	Adjustment part	Description
TRAPEZIUM	Signal generator		[4.DEF] 6.TRAPEZ	(1) Receive the cross-hatch signal. (2) Set the ZOOM mode to FULL. (3) Select 4.DEF from the SERVICE MENU. (4) Select < 6.TRAPEZ >. (5) Set the initial setting value of < 6.TRAPEZ >. (6) Adjust to bring the vertical lines at the right and left edges of the screen parallel. (7) Press the [MENU] key and memorize the set value.
	Remote control unit			
				
CORNER	Signal generator		[4.DEF] 8.COR-UP 9.COR-LO	(1) Receive the cross-hatch signal. (2) Set the ZOOM mode to FULL. (3) Select 4.DEF from the SERVICE MENU. (4) Select < 8.COR-UP >. (5) Set the initial setting value of < 8.COR-UP >. (6) Adjust to bring the straight line at the upper corner. (7) Select < 9.COR-LO >. (8) Set the initial setting value of < 9.COR-LO >. (9) Adjust to bring the straight line at the low corner. (10) Press the [MENU] key and memorize the set value.
	Remote control unit			
				
ANGLE	Signal generator		[4.DEF] 10. ANGLE	• In case where there is a parallelogrammatical distortion of images on the screen. (1) Receive the cross-hatch signal. (2) Set the ZOOM mode to FULL. (3) Select 4.DEF from the SERVICE MENU. (4) Select < 10.ANGLE >. (5) Set the initial setting value of < 10. ANGLE >. (6) Adjust to bring the vertical lines straight. (7) Press the [MENU] key and memorize the set value.
	Remote control unit			
				

Item	Measuring instrument	Test point	Adjustment part	Description
BOW	Signal generator Remote control unit		[4.DEF] 11.BOW	- In case where there is a bow-shaped distortion of images on the screen. - Receive the cross-hatch signal. - Set the ZOOM mode to FULL. - Select 4.DEF from the SERVICE MENU. - Select < 11.BOW >. - Set the initial setting value of < 11. BOW >. - Adjust to bring the vertical lines straight. - Press the [MENU] key and memorize the set value.
				
V. S-SHAPE CORRECTION & V. LINEARITY	Signal generator Remote control unit		[4.DEF] 12.V-S.CR 13.V-LIN	- When the vertical linearity has been deteriorated remarkably, perform the following steps. - Receive the cross-hatch signal. - Set the ZOOM mode to FULL. - Select 4.DEF from the SERVICE MENU. - Select < 13.V-LIN >. - Set the initial setting value of < 13.V-LIN >. - Select < 12.V-S.COR >. - Set the initial setting value of < 12.V-S.COR >. - Adjust < 13.V-LIN > and < 12.V-S.COR > so that the spaces of each line on top, center and bottom become uniform. - Press the [MENU] key and memorize the set value.
				

4.8.4 VIDEO CIRCUIT

Item	Measuring instrument	Test point	Adjustment part	Description
WHITE BALANCE	Signal generator Remote control unit		[2. V/C] 2.CUTOFF R / G 3.WDR R / G / B	(1) Receive the black and white signal (colour off). (2) Set the ZOOM mode to FULL. (3) Set the PICTURE mode to STD. (4) Set the COLURTEMP. to NORMAL. (5) Select 2.V/C from the SERVICE MENU. (6) Select < 2.CUTOFF >. (7) Each select (R), (G) and adjust the screen until the black portion in the screen becomes black. (8) Select < 3.WDR >. (9) Each select (R), (G), (B) and adjust the screen until the white portion in the screen becomes white. NOTE: Do not adjust < 3. WDR G >. (10) Press the [MENU] key and memorize the set value. (11) Change the contrast and brightness from low-light to high-light and check that the tracking of the white balance is good.
REMOTE CONTROL UNIT KEY The diagram shows a 3x3 grid of buttons numbered 1 through 9. To the left of the grid are three boxes: the top one for 'CUTOFF G' (down arrow) and 'WDR G' (down arrow); the middle one for 'CUTOFF R' (up arrow) and 'WDR R' (up arrow); the bottom one for 'CUTOFF R' (down arrow) and 'WDR R' (down arrow). To the right of the grid are three boxes: the top one for 'CUTOFF G' (up arrow) and 'WDR G' (up arrow); the middle one for 'WDR B' (up arrow); the bottom one for 'WDR B' (down arrow). Lines connect the buttons to these boxes: 1 to CUTOFF G (down), 2 to WDR G (down), 3 to CUTOFF G (up), 4 to CUTOFF R (up), 5 to WDR R (up), 6 to WDR B (up), 7 to CUTOFF R (down), 8 to WDR R (down), 9 to WDR B (down).				
SUB BRIGHT	Remote control unit		[2. V/C] 4. BRIGHT	(1) Receive the any broadcast. (2) Set the ZOOM mode to FULL. (3) Set the PICTURE mode to STD. (4) Select 2.V/C from the SERVICE MENU. (5) Select < 4.BRIGHT >. (6) Set the initial setting value of < 4.BRIGHT >. (7) If the brightness is not the best with the initial setting value, make fine adjustment until you get the best brightness. (8) Press the [MENU] key and memorize the set value.
SUB CONTRAST	Remote control unit		[2. V/C] 5. CONT.	(1) Receive the any broadcast. (2) Set the ZOOM mode to FULL. (3) Set the PICTURE mode to STD. (4) Select 2.V/C from the SERVICE MENU. (5) Select < 5.CONT >. (6) Set the initial setting value of < 5.CONT >. (7) If the contrast is not the best with the initial setting value, make fine adjustment until you get the best contrast. (8) Press the [MENU] key and memorize the set value.
SUB COLOUR-1	Remote control unit		[2.V/C] 6.COLOUR (PAL/SECAM/NTSC)	[Method of adjustment without measuring instrument] PAL COLOUR (1) Receive PAL broadcast. (2) Set the ZOOM mode to FULL. (3) Set the PICTURE mode to STD. (4) Select 2.V/C from the SERVICE MENU. (5) Select < 6.COLOUR >. (6) Set the initial setting value of < 6.COLOUR >. (7) If the colour is not the best with the initial set value, make fine adjustment until you get the best colour. (8) Press the [MENU] key and memorize the set value. SECAM COLOUR [AV-28T4SP / AV-32T4SP] (1) Receive the SECAM broadcast. (2) Make fine adjustment of SECAM COLOUR in the same manner as for above. NTSC 3.58 COLOUR (1) Input the NTSC 3.58MHz signal from the EXT terminal. (2) Make similar fine adjustment of NTSC 3.58 COLOUR in the same manner as for above. NTSC 4.43 COLOUR (1) When NTSC 3.58 COLOUR set, NTSC 4.43 COLOUR will automatically set.

Item	Measuring instrument	Test point	Adjustment part	Description										
SUB COLOUR-2	Signal generator	TP-47B	[2.V/C] 6.COLOUR (PAL/SECAM/NTSC)	[Method of adjustment using measuring instrument] PAL COLOUR (1) Receive the PAL full field colour bar signal (75% white). (2) Set the ZOOM mode to FULL. (3) Set the PICTURE mode to STD. (4) Select 2.V/C from the SERVICE MENU. (5) Select < 6.COLOUR >. (6) Set the initial setting value of < 6.COLOUR >. (7) Connect the oscilloscope between TP-47B and TP-E. (8) Adjust PAL COLOUR and bring the value of (A) in the illustration to the values as shown given billow (Voltage difference between white (W) and blue (B)). (9) Press the [MENU] key and memorize the setting value. SECAM COLOUR [AV-28T4SP / AV-32T4SP] (1) Receive the SECAM colour bar signal (75% white). (2) Set the initial setting value of SECAM COLOUR. (3) Adjust SECAM COLOUR and bring the value of (A) in the illustration to the values as shown given billow (Voltage difference between white (W) and blue (B)). (4) Press the [MENU] key and memorize the setting value. NTSC 3.58 COLOUR (1) Input the NTSC 3.58MHz signal (full field colour bar with 75% white) from the EXT terminal. (2) Set the initial setting value of NTSC 3.58 COLOUR. (3) Adjust NTSC 3.58 COLOUR and bring the value of (A) in the illustration to the values as shown given billow (Voltage difference between white (W) and blue (B)). (4) Press the [MENU] key and memorize the setting value. NTSC 4.43 COLOUR (1) When NTSC 3.58 COLOUR set, NTSC 4.43 COLOUR will automatically set.										
	Oscilloscope	TP-E [CRT SOCKET PWB]												
	Remote control unit													
	 [PAL COLOUR VOLTAGE SETTING]<table><tr><td></td><td>Voltage setting</td></tr><tr><td>VOLTAGE (W-B)</td><td>+2V</td></tr></table> [SECAM COLOUR VOLTAGE SETTING]<table><tr><td></td><td>Voltage setting</td></tr><tr><td>VOLTAGE (W-B)</td><td>-8V</td></tr></table> [NTSC COLOUR VOLTAGE SETTING]<table><tr><td></td><td>Voltage setting</td></tr><tr><td>VOLTAGE (W-B)</td><td>+2V</td></tr></table>					Voltage setting	VOLTAGE (W-B)	+2V		Voltage setting	VOLTAGE (W-B)	-8V		Voltage setting
	Voltage setting													
VOLTAGE (W-B)	+2V													
	Voltage setting													
VOLTAGE (W-B)	-8V													
	Voltage setting													
VOLTAGE (W-B)	+2V													
SUB HUE-1	Remote control unit		[2.V/C] 7.HUE	[Method of adjustment without measuring instrument] NTSC 3.58 (1) Input the NTSC 3.58MHz COMPOSITE VIDEO signal (full field colour bar with 75% white) from the EXT terminal. (2) Set the ZOOM mode to FULL. (3) Set the PICTURE mode to STD. (4) Select 2.V/C from the SERVICE MENU. (5) Select < 7. HUE >. (6) Set the initial setting value of < 7. HUE >. (7) If you cannot get the best hue with the initial setting value, make fine adjustment until you get the best hue. (8) Press the [MENU] key and memorize the set value. NTSC 4.43 (1) When NTSC 3.58 is set, NTSC 4.43 will be automatically set at the respective values.										

Item	Measuring instrument	Test point	Adjustment part	Description				
SUB HUE-2	Signal generator	TP-47B TP-E [CRT SOCKET PWB]	[2.V/C] 7.HUE	[Method of adjustment using measuring instrument] NTSC 3.58 HUE (1) Input the NTSC 3.58MHz signal (full field colour bar with 75% white) from the EXT terminal. (2) Set the ZOOM mode to FULL. (3) Set the PICTURE mode to STD. (4) Select 2.V/C from the SERVICE MENU. (5) Select < 7. HUE >. (6) Set the initial setting value of < 7. HUE >. (7) Connect the oscilloscope between TP-47B and TP-E. (8) Adjust < 7. HUE > to bring the value of (B) in the illustration to the values as shown given below (voltage difference between white (W) and magenta (M)). (9) Press the [MENU] key and memorize the setting value. NTSC 4.43 HUE (1) When NTSC 3.58 COLOUR set, NTSC 4.43 COLOUR will automatically set.				
	Oscilloscope Remote control unit							
 [VOLTAGE SETTING] <table><tr><td></td><td>Voltage setting</td></tr><tr><td>VOLTAGE (W-M)</td><td>-10V</td></tr></table>					Voltage setting	VOLTAGE (W-M)	-10V	
	Voltage setting							
VOLTAGE (W-M)	-10V							
SECAM BLACK OFFSET	Signal generator	TP-47B TP-E [CRT SOCKET PWB]	[2.V/C] 8. BLACK OFFSET	(1) Receive the SECAM full field colour bar signal. (2) Set the ZOOM mode to FULL. (3) Set the PICTURE mode to STD. (4) Select 2. V/C from the SERVICE MENU. (5) Select < 8. BLACK OFFSET >. (6) Set the initial setting value of < 8.BLACK OFFSET >. (7) Connect the oscilloscope between TP-47B and TP-E at the CRT SOCKET PWB. (8) Press [1] and [2] keys alternately (turn the colour on and off), check the waveform of difference in the voltage. (9) While looking at the waveform, adjust < 8.BLACK OFFSET > to become same level of the signal voltage of black and white waveform by pressing [6] or [9] keys of remote control unit. (10) Press the [MENU] key and memorize the set value.				
	Remote control unit							
 It adjusts so that the voltage of B/W and COLOUR waveform may become the same.  [TP-47B WAVEFORM]								

4.8.5 VSM PRESET SETTING

Item	Measuring instrument	Test point	Adjustment part	Description
VSM PRESET	Remote control unit		[5.VSM PRESET] (BRIGHT/STD/STD/STD) 1. BRIGHT 2. CONT. 3. COLOUR 4. SHARP 5. HUE (COOL/WARM/NORMAL) 1. WDR R 2. WDR G 3. WDR B	(1) Set the ZOOM mode to FULL. (2) Select 5.VSM PRESET from the SERVICE MENU. (3) Press the [MENU] key, and set the PICTURE MODE to BRIGHT. (4) Adjust the [FUNCTION UP/DOWN] and [-/+] key to bring the set values of 1.BRIGHT to 5. HUE to the values shown in the [5. VSM PRESET]. (5) Press the [MENU] key, and set the PICTURE MODE to STD. (6) Make similar adjustment as in 3 above. (7) Press the [MENU] key, and set the PICTURE MODE to SOFT. (8) Make similar adjustment as in 3 above. (9) Press the [MENU] key, and set the COLOUR TEMP to COOL. (10) Adjust the [FUNCTION UP/DOWN] and [-/+] key to bring the set values of 1.WDR R to 3. WDR B to the values shown in the table. (11) Press the [MENU] key, and set the COLOUR TEMP to WARM. (12) Make similar adjustment as in 9 above. (13) Press the [MENU] key, and set the COLOUR TEMP to NORMAL. (14) Make similar adjustment as in 9 above.

4.8.6 AUDIO CIRCUIT

- Do not adjust 3.AUDIO of the SERVICE MENU. Not to change the values of 1. DCX0 ADJ., 2. ERROR LIMIT. 3. A2 ID THR .

SECTION 5

TROUBLE SHOOTING

This service manual does not describe TROUBLE SHOOTING.



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